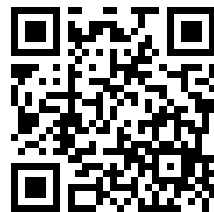

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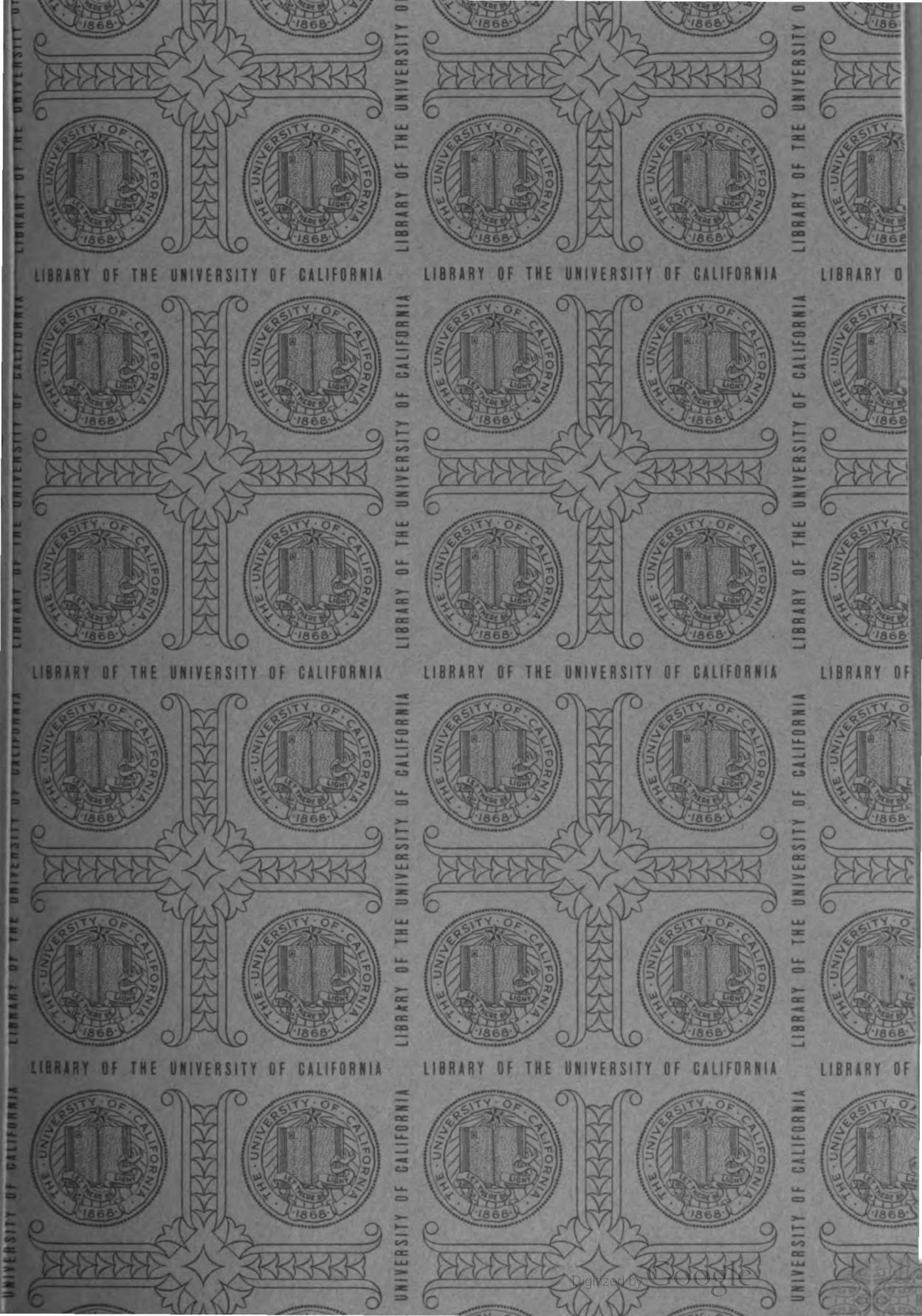
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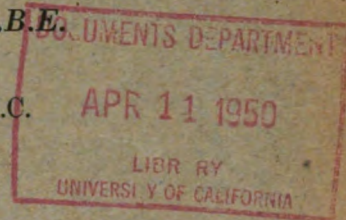
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THE BURMA CAMPAIGNS—1942–1945 CLINICAL ASPECTS

BY

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In a recent report in this Journal, Wigglesworth (1948) has given a detailed account of the administrative aspects of the evacuation of casualties from the fighting front in Burma during the Japanese campaigns. He divides the campaigns into four phases as follows:

Phase I.—The Retreat from Burma, 1942

Phase II.—The Defence of India's Eastern Frontier, 1942–1944

Phase III.—The Liberation of Burma, 1944–1945

Phase IV.—The Occupation of Burma and After, 1945.

Numerous articles have been written about the medical condition of released prisoners of war in Phase IV of the above operations, but general clinical reports of the diseases of British troops taking part in the campaigns are not numerous. Excellent accounts have, however, been given by Leishman and Kelsall (1944), Marriott (1945), and by Marriott, Hill, Hawksley and Bomford (1946). Marriott and Bomford showed that the ratio of disease to battle casualties was 121 to 1 in 1943, 19 to 1 in 1944, and for the 14th Army's campaign in 1945 it was 3.4 to 1. Major-General Thompson (1948) has published notes about the Burma Retreat of 1942.

The present report deals with a relatively small number of British troops admitted to hospital medical divisions during Phases II, III and IV, and it is presented in the nature of a supplement to Wigglesworth's account, as a fairly representative sample of the types of diseases that were encountered. Detailed notes were kept about British patients seen over short periods at various points on the line of evacuation (*see fig. 1*). In addition, reference is made to many of

the published articles dealing with the diseases encountered in India and Burma during the war. The records from which this report is made were maintained under the heading of symptoms of onset, and are presented here in this manner, to indicate the types of clinical problems that occurred. Some of the difficulties involved in diagnosing cases of tropical disease are discussed by Manson-Bahr (1947).

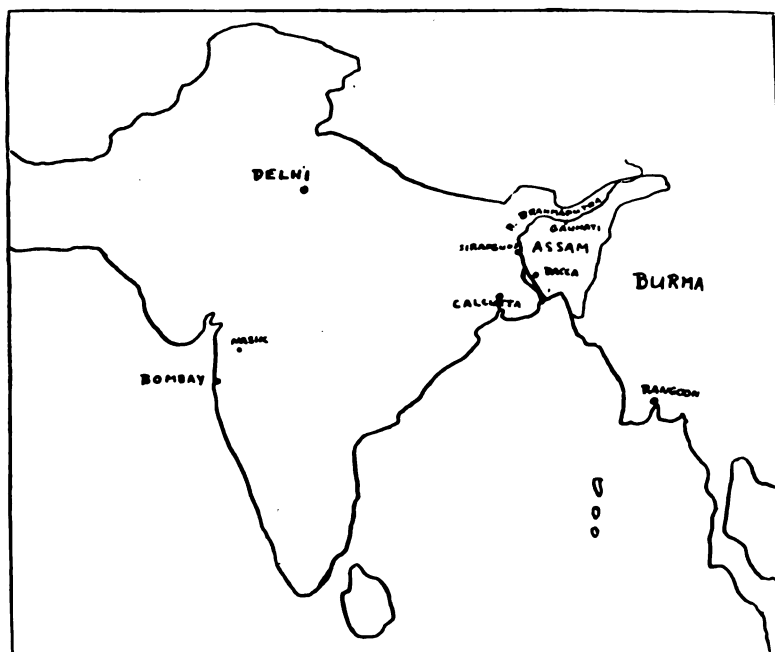


FIG. 1.—Map to show situation of hospitals.

Phase II.—Over a period of two months in July and August 1944, 342 British patients were admitted to an Indian General Hospital sited near Nasik in Bombay Presidency. Most of the cases admitted here came from a division of troops composed of men who had not yet taken part in jungle warfare, and who had spent their period of service in India on the west side of the country. The findings on these men are indicative of the types of disease encountered in the ordinary course of events in troops stationed in India.

Phase III.—In a period of two months during Phase III, 140 British medical patients passed through the Indian General Hospital at Sirajgunj; this was during December 1944 and January 1945, and as Wigglesworth (1948) has shown, at this time the hospital was receiving men from Dacca and Gauhati on their way to Calcutta and to Base Hospitals in India. The cases evacuated through this hospital were patients not expected to recover within three months.

Phase IV.—180 released white prisoners were seen at a British General Hospital in Rangoon in September 1945, immediately following their liberation from Japanese camps, mostly in Thailand.

It should be noted that many Indian patients were admitted to the hospital at Nasik, and that they outnumbered the British patients at Sirajgunj, but that particulars of these Indian cases are not included in the present report. In order to conserve space, particulars of the men seen at these two hospitals have been combined together. The condition of the released prisoners will be considered separately.

Phases II and III: Fever.—This was the commonest presenting feature of illness in the patients seen both at Nasik and in those being evacuated through

TABLE I.—FINAL DIAGNOSIS OF 242 PATIENTS ADMITTED TO HOSPITAL ON ACCOUNT OF FEVER

Disease	No. of cases	
	Nasik	Sirajgunj
B.T. malaria	92	7
M.T. malaria	24	6
B.T. and M.T. malaria	4	2
"Clinical malaria"	10	—
Pyrexia of unknown origin	21	—
M.T. malaria with anæmia	3	—
B.T. malaria with anæmia	—	1
M.T. and B.T. malaria with anæmia	—	1
Cerebral malaria	1	1
Scrub typhus	—	20
Scrub typhus and B.T. malaria	—	6
Scrub typhus and M.T. malaria	—	6
Scrub typhus, B.T. and M.T. malaria	—	3
"Clinical" typhus	—	4
Scrub typhus and clinical malaria	—	1
Quartan malaria	1	—
Scrub typhus, B.T. malaria, amoebic dysentery	—	2
Scrub typhus, B.T. and M.T. malaria, bacillary dysentery	—	1
Amoebic hepatitis and clinical malaria	—	1
Clinical malaria and anxiety state	—	1
Clinical malaria and effort syndrome	—	1
Typhoid, B.T. and M.T. malaria, amoebic dysentery	—	1
Dengue	2	—
Subacute rheumatism	1	—
Amoebic hepatitis	1	—
Tonsillitis	1	—
Pharyngitis	2	—
Sinusitis	1	—
T.A.B. reaction	1	—
Bronchitis	1	—
Urticaria	2	—
B.T. malaria and jungle sores	—	1
Pneumonia	1	—
Acute rheumatism and B.T. malaria	—	1
Glandular fever	1	—
B.T. malaria and acute nephritis	—	1
M.T. malaria and gonococcal arthritis	—	1
Infective hepatitis	1	—
Clinical malaria, typhus, brachial neuritis	—	1
Coryza	1	—

Sirajgunj. As can be seen in Table I, the cases passing through the latter hospital reflected the fact that scrub typhus was an infection of serious import in the course of jungle fighting in Assam and Burma.

Malaria.—It has been shown by Marriott (1945) that in the early stages of the fighting this was the major medical problem, accounting for nearly half of all the total sickness; Leishman and Kelsall (1944) report that of a total of 11,645 patients admitted to a base hospital, 2,819 had malaria. In May and June 1943 the A.L.F.S.E.A. malaria rate was 2.5 per thousand per day. In the summer of 1944 it was over 2.0 per thousand per day, but for the first five months of 1945 it had fallen to 0.35 per thousand per day or less. This improvement was due to strict enforcement of antimalarial discipline, largely following the work of Fairley (1945) who showed clearly the value of mepacrine as a suppressive agent. More recently Fairley (1946) has reported on the use of paludrine in antimalarial prophylaxis and treatment. The varying sensitivity of different geographical strains of *Plasmodium falciparum* to therapeutic agents is, however, commented on by Fairley (1949a). The recent major advances in knowledge of the life cycle of the malaria parasite in the body have been reviewed by the same author (1949b).

Every effort was made to treat malaria as far forward as possible; this, and the strictly enforced use of suppressive mepacrine, is reflected in the fact that the cases of malaria that passed through Sirajgunj during the two months under review in 1944-45 were complicated ones, malaria usually being present as a complication of some other disease. In Nasik, in 1944, on the other hand, in an area where suppressive mepacrine was not being used, 136 malaria cases were seen in two months. In most patients suffering from this disease alone, the symptoms were of chill with headache, weakness and malaise. Sometimes there was nausea or vomiting, and occasionally abdominal pain. It will be seen later that a few of the malaria patients first reported on account of symptoms other than fever; the blood had always to be examined carefully for the presence of malarial parasites in the course of other diseases.

In the majority of cases it was possible to make a definite diagnosis of malaria from the demonstration of parasites in the blood film; both thick and thin films were taken, if possible during a rigor. It will be seen from Table II that it was usually possible to find the parasites on the day of admission. One important point that had to be borne in mind in dealing with suspected M.T. malaria was that the patient's life should never be endangered by the delaying of treatment in order to obtain a positive blood slide.

TABLE II.—DAY OF ADMISSION TO HOSPITAL ON WHICH POSITIVE BLOOD FILM WAS OBTAINED

Day of Admission to Hospital (Nasik)	No. of cases with positive slide	
	B.T.	M.T.
First day	79	23
Second day	9	0
Third day	4	1

The fact that so many of the blood films were positive on the day of admission was possibly because the hospital was situated in close proximity to the troops admitted to it, and that they were sent direct to hospital at the onset of symptoms.

All the patients suffering from M.T. malaria who had first reported on account of symptoms of a febrile state had at some time while in hospital a temperature of 100° or more, but in 12 patients with B.T. infection the temperature did not exceed 100°. Higher temperatures might have been recorded had treatment been delayed. Some patients with malaria, including the more dangerous M.T. form, were admitted for symptoms other than those of fever, and it was well recognized that such cases, whether afebrile or suffering from low fever, were especially dangerous and required careful supervision. Where a fever of more than 100° lasted for six days or longer despite treatment, the patient had to be given a very detailed examination for complicating disease.

TABLE III.—HIGHEST TEMPERATURE RECORDED WHILE IN HOSPITAL WITH PROVED UNCOMPLICATED MALARIAL INFECTION

Temperature (°F.)	98-99	99-100	100-101	101-102	102-103	103-104	104-105	105-106
No. of cases B.T.	2	10	14	13	21	16	12	4
M.T.	—	—	2	2	9	4	5	2

Medical officers without tropical experience were often puzzled as to the likelihood of a patient without a palpable spleen having malaria, and as to whether it was common for a patient with acute malaria to have a palpable liver. Kern and Norris (1944) report that 59 of 100 cases of malaria in their experience had palpable livers and that this was not evidence of chronicity. Leishman and Kelsall (1944) state that chronic anæmia and persistent splenomegaly was rarely seen in their experience, even in patients who had had as many as 15 attacks of malaria in as many months. Routine blood counts were not done on all patients in the present series.

TABLE IV.—UNCOMPLICATED CASES OF MALARIA WITH PALPABLE LIVER OR SPLEEN (SEEN AT NASIK)

<i>Cases of B.T. malaria</i>				<i>Spleen palpable</i>	<i>Liver palpable</i>	<i>Both</i>	<i>Neither</i>
<i>No. of previous attacks of malaria</i>							
	<i>None</i>	<i>...</i>	<i>...</i>	26	1	6	42
	1	...	...	3	—	—	5
	2	...	...	2	—	—	—
	3	...	...	—	—	—	1
	4	...	...	1	—	—	1
	7	...	...	1	—	—	—
	9	...	...	1	—	—	1
<i>Cases of M.T. malaria</i>							
	<i>None</i>	<i>...</i>	<i>...</i>	5	1	3	13
	1	...	...	—	—	1	—
	2	...	...	—	1	—	—
<i>Cases of B.T. and M.T. malaria</i>							
	<i>None</i>	<i>...</i>	<i>...</i>	1	—	—	1
	1	...	...	1	—	—	—
	2	...	...	—	—	—	1

Scrub Typhus.—This mite-borne infection proved to be a serious problem amongst men fighting their way through the jungles of Assam and Burma. Sayers and Hill (1948) report 2,388 cases with 259 deaths in the 14th Army in nine months in 1944. The mortality rate in British troops at that time was 12·76 per cent. Scrub typhus occurs where the vegetation is suitable for the breeding of mites, usually in areas infested with rats or other reservoir hosts, possibly including both mammals and birds. Willcox (1949) has given an account of 493 cases with 11 per cent mortality in Europeans, and Tattersall (1945) has recorded 700 cases. A report has been given by Sayer *et al.* (1946), and Mackie (1946) gives a detailed preliminary report of the work of the U.S.A. Typhus Commission in the China-Burma-India theatre. Some cases of scrub typhus occurred, too, in other parts of India (Proc. Conf. Medical Specialists Central Command & N.W. Army, and Sayers & Hill (1948)). At the time of the campaigns, no promising drug such as chloramphenicol was available, and immunization experiments were unsuccessful. The extent of the problem is brought out by the report of Marriott (1945), who states that one man was affected out of every 100 exposed to infection.

In two months, 43 men who had been suffering from the disease passed through the Sirajgunj Hospital. The clinical features were similar to those recorded elsewhere, and hence will not be given in detail. The main features were pyrexia, headache, drowsiness, enlarged glands, splenomegaly, conjunctivitis, chest signs and symptoms, and occasionally deafness. Willcox (1949) points out that serial Weil Felix tests were necessary for diagnosis, but if only one single test was possible, a 1/250 reading to OXK was significant if the clinical features were consistent with the diagnosis. He had 37 negative Weil Felix tests out of 100 patients examined in forward areas, since the test was so commonly negative before the twelfth day.

The possibility of kala azar had to be considered in the differential diagnosis of causes of fever. One specialist saw ten examples of this disease in British troops in 1943 (Proc. Conf. Medical Specialists Central Command & N.W. Army).

DIARRHOEAL DISEASES

As Marriott (1945) has pointed out, diarrhoea and dysentery were second only to malaria as a cause of sickness. In 1944 in the Eastern operational area one man in ten of the total force was admitted to medical units for diarrhoea and dysentery. Every military hospital had its dysentery ward. During the period under consideration 70 cases were admitted to this ward in the hospital at Nasik, and 21 passed through Sirajgunj. It should be noted, however, that the great majority of cases in forward areas were not evacuated to base hospitals.

The common diarrhoeal diseases were bacillary dysentery, amœbic dysentery, simple diarrhoea and sprue. The advent of sulphaguanidine and the fact that large supplies of it were obtained in 1944 resulted in prompt and efficient

treatment of the bacillary cases. There has always been much discussion as to the best methods of treating amœbic dysentery, and from preventing it from becoming chronic. A definite and prolonged course of treatment with careful follow-up investigations was introduced. This research continues, and recently it has been suggested that thioarsenites are very valuable therapeutic agents (Anderson *et al.*, 1949). Results of treatment with aureomycin are said to be promising (McVay *et al.*, 1949).

Das Gupta (1945) claims that examination of the stools of 300 B.O.R.s who had served for one year in India revealed that 26 per cent had infection with *Entamœba histolytica*. This may have been due to contamination of the Calcutta water supply with sewage. Payne (1945) reports on some 2,000 cases of dysentery in Eastern India, 1,000 of which were amœbic, amœbic infection being one and a half times as common as bacillary in his experience. Fifty per cent of the amœbic patients had mild amœbic hepatitis and of 700 British cases 1.1 per cent developed liver abscess. Leishman and Kelsall (1944) found amœbic infection in approximately one-fourth of their admissions for diarrhœa. Cropper (1945 and 1949) stresses the importance of sigmoidoscopic examination in making a diagnosis, and Adams (1944) reports poor results in the follow-up of patients evacuated to the U.K. from India and Burma at a time when, in his opinion, too much faith had been placed in the use of emetine alone. He points out too the importance of eliminating complicating factors, such as treating secondary streptococcal infection with penicillin and looking for complicating flagellate infection, bacillary dysentery, malaria, kala azar, and carcinoma of the rectum.

Despite intensive work on the subject, the whole problem of steatorrhœa in India and Burma remains a mystery. Keele and Bound (1946) report on 600 patients with the disease, and point out that the maximum incidence was after one to two years of service in India. The earliest occurrence was in the Red Sea *en route* to India. The disease was seasonal in onset, but the incidence of sprue preceded that of amœbic and bacillary dysentery. As has been shown by Bennet (1946), sprue was uncommon amongst prisoners of war in the Japanese camps, but very many cases occurred in Assam and Burma. The absence of sprue in the prison camps has been attributed by Gilroy (1947) to lack of fat in the diet of the prisoners. The condition was seen amongst the Chindits, as reported by Morris (1945) and Keele and Bound (1946); Stefanini (1947) observed 1,069 cases of tropical sprue occurring among 12,000 Italian prisoners of war in a camp in the Himalayan foothills. Although all Italian prisoners of war in India received substantially the same diet, sprue developed in only one camp.

It has long been said that sprue does not occur in Indians, and yet Indian troops in areas East of the Brahmaputra River went down in large numbers with diarrhœa which was sometimes fatty, and often complicated by a macrocytic anæmia, and evidence of vitamin deficiency states. In these regions the syndrome affected Indian troops much more severely than it did British

or African troops. Accounts of the syndrome as it affected Indians have been given by Girdwood (1948) and by Passmore (1949). Perusal of these papers indicates the difficulty that exists in differentiating between sprue and primary malnutrition. Reports on sprue in British personnel have been given by Keele (1946) and Ayrey (1947). Keele (1949) has followed up 62 of his cases for a period of two years in Britain; in them, dietetic therapy was used alone as far as possible, but some patients were given, in addition, parenteral liver therapy, nicotinic acid, or riboflavin. Complete remission occurred in 69.4 per cent of the men and definite relapse in 16.1 per cent. Keele states that 1,073 cases were sent back to the U.K. between 1943 and 1946. Woodruff (1949) reports that of 34 patients sent home, all but 3 were very well three years after they contracted the disease.

Table V shows the diagnosis reached in patients admitted to hospital at Nasik, or passing through Sirajgunj whose primary complaint had been of diarrhoea.

TABLE V.—DIAGNOSIS OF PATIENTS ADMITTED WITH DIARRHOEA, GIVING APPROXIMATE DAILY NUMBER OF STOOLS WHEN FIRST ADMITTED TO A HOSPITAL

Diagnosis	Hospital	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16-20	Stools
Bacillary dysentery	N	*	—	—	—	1	4	—	—	1	2	1	6	—	1	1	3	
	S	*	—	—	—	—	—	1	—	—	1	—	—	—	—	—	—	
Simple diarrhoea	N	—	—	4	3	3	5	3	1	—	1	1	2	1	—	—	1	1
	S	—	—	—	2	—	—	1	—	—	1	—	—	—	—	—	—	
Amoebic dysentery	N	—	2	6	1	1	2	—	1	3	1	—	—	—	—	—	—	
	S	—	—	—	1	1	2	2	—	1	—	1	—	—	—	—	—	
Giardiasis	N	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	
Sprue	S	—	—	1	1	—	—	—	—	—	—	1	—	—	—	—	—	
Ascariasis	N	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Ankylostomiasis	N	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	
Amoebic dysentery and sprue	S	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	
Amoebic and bacillary	N	—	—	—	—	—	1	—	—	—	—	1	—	—	—	—	—	
Dysentery	S	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	
Amoebic dysentery and giardiasis	S	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	
Pulmonary T.B.	N	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	
<i>Balantidium coli</i> infestation	S	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	
M.T. malaria	S	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	

*Indicates whether Nasik or Sirajgunj Hospital.

In 9 of the patients, malaria was a complicating factor. Amoebic and bacillary dysentery differed in the typical textbook manner. In bacillary infection, the illness was more acute, blood or mucus frequently being present with little or no faecal matter, whereas in amoebic dysentery the stool was usually more solid, with blood or mucus adhering to the faecal matter. The possibility of a mixed infection had always to be considered. Higher temperatures were generally recorded in bacillary dysentery, although this was not

invariable. None of the cases seen at Nasik were of the chronic type, and as these patients were seen from the commencement of their stay in hospital, it was possible to keep a record of the type of stool passed, as in Table VI.

TABLE VI.—DESCRIPTION OF TYPE OF STOOL PASSED IN AMŒBIC AND BACILLARY DYSENTERY

Description of stool	No. of cases	
	Amœbic	Bacillary
Formed	—	—
Formed with blood visible ...	1	—
Formed with mucus visible ...	2	—
Formed with blood and mucus ...	2	—
Semi-solid	2	1
Semi-solid with blood	3	—
Semi-solid with blood and mucus	3	2
Watery	1	—
Watery with blood	1	—
Watery with mucus	—	—
Watery with blood and mucus	2	9
Blood and mucus; no fæcal matter	—	8

TABLE VII.—HIGHEST TEMPERATURE RECORDED IN CASES OF DYSENTERY

Temperature	No. of cases	
	Amœbic	Bacillary
97.5° — 98°	5	2
98° — 98.5°	4	3
98.5° — 99°	7	3
99° — 100°	1	3
100° — 101°	—	3
101° — 102°	—	2
102° — 103°	—	2
103° — 104°	—	2

Only uncomplicated cases are included in Tables VI, VII and VIII. Stools were examined daily both naked eye and microscopically. The number of days before a stool was found to be positive for amœbæ is shown in Table VIII. In any suspected case where the stool was persistently negative, sigmoidoscopy was carried out; this examination was done also at the end of the period of treatment of all amœbic cases.

TABLE VIII.—NUMBER OF DAYS BEFORE VEGETATIVE FORMS OF *Entamœba histolytica* WERE FOUND IN THE STOOLS IN CASES OF AMŒBIC DYSENTERY

No. of days	No. of cases	No. of days	No. of cases
1	—	8	—
2	5	9	—
3	2	10	1
4	2	11	—
5	1	12	1
6	3	13	—
7	2	14	—

It should, however, be stressed that in chronic cases difficulty may be experienced in finding the amœbæ in the stool.

In a man suffering from illness during or following service in the East, even although there is no history of diarrhœa, the possibility of amœbic infection must always be considered. The commonest forms that this may take are amœbic dysentery, vague abdominal symptoms, dyspepsia, appendicitis, hepatitis, hepatic abscess, pleurisy, pleural effusion or empyema, sub-phrenic abscess, hæmorrhoids, a tumour formation simulating carcinoma of the colon or rectum, and amœbiasis of the skin. Examples of all these were seen during eighteen months spent in the two hospitals mentioned in this report.

OTHER ABDOMINAL SYMPTOMS

Vomiting.—7 patients were admitted at Nasik on account of vomiting. The final diagnoses were shown in Table IX.

TABLE IX.—DIAGNOSIS IN CASES OF VOMITING

<i>Diagnosis</i>	<i>Notes</i>
Infective hepatitis and giardiasis	Stools loose; jaundice developed later
M.T. malaria	Afebrile
Gastric ulcer and giardiasis	
Duodenal ulcer	
T.B. peritonitis	
Ankylostomiasis	
Functional dyspepsia	

Abdominal Pain.—6 patients were admitted with this complaint. No abnormality was found in one, and another was diagnosed as having psychoneurosis. A third man was thought to have hyperchlorhydric dyspepsia, but a routine blood film showed M.T. crescents. The fourth patient, who felt generally out of sorts, had a hæmoglobin of 9·8 grammes per cent, and a slight evening rise of temperature; the blood film revealed a mixed infection with B.T. and M.T. malaria. Another man had amœbic hepatitis and M.T. malaria, whilst the sixth had vegetative forms of amœbæ in the stool, but no diarrhœa.

Abdominal Swelling.—4 patients passed through Sirajgunj after having reported on account of abdominal swelling. One had amœbic abscess of the liver, 2 had amœbic hepatitis, and the fourth was undiagnosed. A fifth man who complained of only anorexia and headache reached Sirajgunj undiagnosed, and was found to have amœbic hepatitis.

JAUNDICE

Infective hepatitis was a problem in India, although the disease did not become as prevalent as in certain other theatres. 992 of Leishman and Kelsall's 11,645 patients suffered from this disease. At the time no attempt

was made to distinguish between infective hepatitis itself and homologous serum jaundice with its longer incubation period, but it was realized that jaundice was common in patients undergoing treatment for venereal disease, and that this was probably due to spread of infection by virus-contaminated syringes. In the two months under consideration 42 patients were admitted to the jaundice ward at Nasik with a diagnosis of infective hepatitis, and in 4 of these men the disease had followed arsenical therapy for syphilis. One man was thought to have "hepatitis sine ictero"; no severe cases were seen, and no patients with evidence of neurological involvement as described by Byrne and Taylor (1945) or by Stokes and Miller (1947) occurred. These last authors have described an epidemic of a severe form of infective hepatitis that was encountered in Burma during the later phases of the campaigns.

SYMPTOMS SUGGESTING RESPIRATORY DISEASE

The diagnoses in the 34 cases seen at the two hospitals were as shown in Table X.

TABLE X.—SYMPTOMS IN PATIENTS ADMITTED WITH SUSPECTED RESPIRATORY DISEASE

<i>Main symptoms</i>	<i>Final diagnosis</i>	<i>No. of cases</i>
Chronic cough and breathlessness	Chronic bronchitis	13
	Chronic bronchitis; ankylostomiasis	1
Cough and pain in the chest	Acute bronchitis	1
Cough and loss of weight	Anxiety state	1
	Pulmonary tuberculosis	2
Breathlessness	Chronic bronchitis	1
	Thyrotoxicosis	1
	Fibroid tuberculosis	1
	Complete heart block	1
Breathlessness and collapse	Spontaneous pneumothorax	1
	Heat exhaustion	1
Loss of weight	Tapeworm infestation	1
Husky voice	Chronic laryngitis	1
Choking attack	Ascaris escaping through the mouth	1
Cough with fever	Scrub typhus	1
Pain in the chest	Pulmonary T.B. with pleurisy	1
	Bornholm's disease	1
	Amœbic hepatitis	2
	Pulmonary tuberculosis	1
Hæmoptysis, loss of weight	Amœbic infection of the lung	1

The importance of always being on the look-out for amœbiasis is brought out by this table. In a suspected case of amœbic hepatitis it was always important to screen the chest for impaired movement of the diaphragm.

DISEASES OF THE CENTRAL NERVOUS SYSTEM

Nineteen cases came under this heading, and these are summarized in Table XI.

TABLE XI.—DISEASES OF THE CENTRAL NERVOUS SYSTEM

Clinical features	Diagnosis	No. of cases	
		Nasik	Sirajgunj
Headache and neck rigidity	Infective mononucleosis	1	—
Headache	Migraine	1	—
Sciatic pain	Prolapsed disc	1	—
Fever and coma	Cerebral malaria	1	—
Paralysis (extensive; fatal)	Acute anterior poliomyelitis	1	—
Pain in the arm	Brachial radiculitis	1	1
Weakness			
Legs only	Polyneuritis following	—	2
Legs and arms	jungle sores	—	6
Legs, arms, swallowing		—	1
Legs, arms, accommodation		—	1
Weakness of the legs	Polyneuritis, cause uncertain	—	1
Jacksonian epileptic fits	Cysticercosis	—	1

Polyneuritis.—In Assam and Burma, diphtheritic ulcers of the legs (Naga sores) were common, and polyneuritis was a frequent complication. An account of different forms of cutaneous diphtheria has been given by McKenna (1944) who describes the following types: Acute eczematous; acute bullous; ulceration with cellulitis; chronic eczematous. Leigh (1948) reports on diphtheritic paralysis in troops fighting in Burma, and shows that there was no correlation between the number of sores and the degree of polyneuritis. In his series of 183 cases of post-diphtheritic polyneuritis, 150 followed jungle sores, 73 having also had sore throat, and 31 followed what was probably asymptomatic faucial diphtheria. 43 per cent of his total number of patients had palatal paresis, and 68 per cent had blurring of vision. The source of infection was thought to be British carriers of diphtheritic organisms. Two-thirds of the cases occurred in the monsoon months of April to July.

Occasional examples were seen, too, of a form of acute brachial radiculitis, a condition described by Turner (1944), in which pain over the back of the shoulder and outer side of the arm was followed by paralysis of some muscles of the same area. In cases of epilepsy occurring *de novo* after service in the East, the possibility of cysticercosis has to be borne in mind.

OTHER DISEASES

The further 42 cases seen at the two hospitals presented no special features. No case of smallpox was seen during the period under review. Leishman (1944) has given a report on his experience of the disease. Between November 1942 and April 1943 he saw 68 cases at an Indian Base General Hospital. 22 were major, the remainder having been modified by vaccination.

Thomson (1946) has referred to the difficulty in supplying food to the troops in Burma, but no cases of primary malnutrition were seen in the present series in British troops, other than those released from Japanese P.O.W. camps and referred to later. In contrast to this is the report of Morris (1945), who reported on the health of 401 Chindits who took part in General Wingate's second operation. The outstanding feature in these men was severe wasting.

In 186 patients examined, the mean hæmoglobin was 85 per cent (11·9 grammes/100 ml.). The malnutrition was thought by Morris to be due to under-consumption and diarrhœa, but the condition may have been a form of the sprue syndrome. 86 of the 401 men had glossitis, flatulence, and diarrhœa, 87 had infective hepatitis (22 per cent of the whole group), 128 had malaria, and 14 had suffered from polyneuritis.

No patients suffering from the effects of dehydration or overheating were seen in the periods under review, although several cases of heat exhaustion and heat stroke, two of which were fatal, occurred near Nasik when men fresh from the United Kingdom performed a march in the heat of the day.

PREVIOUS ILLNESSES

Records were kept of previous illnesses suffered in the East by all the medical in-patients seen during the two periods of two months, and these are shown in Table XII. In this table, surgical conditions are also included; it is obvious that medical diseases were far more important as causes of invaliding of the men.

TABLE XII.—PREVIOUS ILLNESSES THAT OCCURRED IN THE EAST, AND LENGTH OF SERVICE OF MEN SEEN AT NASIK AND SIRAJGUNJ

Disease	Service: Less than	$\frac{1}{2}$	$\frac{1}{2}$ -1	1-2	2-3	3-4	4-5	5 or more years
No previous illness in India or Burma ...	27	42	58	112	36	22	2	
B.T. malaria 1 attack ...	1	1	5	6	4	1	1	
2 attacks ...	—	—	1	1	—	—	—	
3 attacks ...	—	—	—	2	—	—	—	
4 attacks ...	—	—	1	2	—	—	—	
5 attacks ...	—	—	—	—	1	—	—	
7 attacks ...	—	—	—	1	—	—	—	
10 attacks ...	—	1	—	1	—	—	—	
more than 10 attacks ...	—	—	—	2	—	—	—	
Malaria, type uncertain; several attacks	—	3	1	5	1	—	—	
M.T. malaria 1 attack ...	—	1	1	1	—	—	—	
2 attacks ...	—	1	—	—	—	—	—	
3 attacks ...	—	—	—	1	—	—	—	
B.T. and M.T. malaria (several attacks)	—	4	1	10	2	—	1	
Bacillary dysentery (once) ...	4	2	2	7	—	—	—	
(twice) ...	—	—	—	1	—	—	—	
(thrice) ...	—	—	1	—	—	—	—	
Amœbic dysentery (once) ...	—	—	3	2	—	—	—	
(twice) ...	—	—	—	1	—	—	—	
Diarrhœa ...	1	2	—	2	—	—	—	
Amœbic and bacillary dysentery ...	—	—	1	2	—	—	—	
"Dysentery" ...	—	—	1	—	1	—	—	
Bacillary dysentery; malaria ...	—	—	—	3	—	—	—	
Bacillary dysentery; typhoid ...	—	—	—	1	—	—	—	
Bacillary dysentery; appendicitis ...	—	—	—	1	—	—	—	
Bacillary dysentery; infective hepatitis ...	—	—	—	1	1	—	—	
Amœbic dysentery; malaria ...	—	—	1	3	—	—	—	
Clinical dysentery; malaria ...	—	—	1	2	—	—	—	
Venereal disease ...	—	2	4	11	1	2	—	

Disease	Service:	Less than	$\frac{1}{12}$	$\frac{1}{12}-1$	1-2	2-3	3-4	4-5	5 or more years
Bronchitis	—	—	—	1	—	—	—
Venereal disease; malaria	—	—	1	1	—	—	—
Jungle sores	—	2	7	2	2	—	—
Diarrhoea; malaria	—	—	—	1	—	—	—
Scrub typhus	—	—	—	1	—	—	—
Infective hepatitis	—	—	1	1	—	—	—
Head injury	—	—	2	3	—	—	—
Gunshot wound	—	—	1	—	—	—	—
Pneumonia	—	—	1	—	—	—	—
Pyrexia of unknown origin	1	1	—	1	—	1	—
Dyspepsia	—	—	—	1	—	—	—
Septicæmia	—	—	1	—	—	—	—
Renal colic	—	—	—	1	—	—	—
Tonsillitis	—	—	—	1	—	—	—
Amoebic hepatitis	—	—	—	1	—	—	—
Diphtheria	—	—	—	1	—	—	—
B.T. malaria; dengue	—	—	1	—	—	—	—
Infective hepatitis; bronchitis	—	—	—	1	—	—	—
Bacillary dysentery; venereal disease	1	—	—	—	—	—	—
M.T. malaria; appendicitis	—	—	—	—	—	—	1
M.T. malaria; gunshot wound	—	—	—	1	—	—	—
Clinical malaria; infective hepatitis	—	—	—	1	—	—	—
Clinical malaria; jungle sores	—	—	—	1	—	—	—
Bacillary dysentery; malaria; ankylostomiasis	—	—	—	—	—	—	1
Amoebic and bacillary dysentery; malaria	—	—	—	1	1	—	—
Amoebic dysentery; malaria; infective hepatitis	—	—	—	1	—	—	—
Typhus; malaria; infective hepatitis	—	—	—	1	—	—	—
Sandfly fever; dengue; malaria; pneumonia	—	—	1	—	—	—	—
Malaria; bacillary dysentery; jungle sores	—	1	—	—	—	—	—
Malaria; jungle sores; infective hepatitis; V.D.	—	—	1	—	—	—	—
Malaria; infective hepatitis; bacillary dysentery	—	—	—	1	—	—	—

Phase IV.—Records were kept of 180 released European prisoners seen at a British General Hospital in Rangoon immediately following their liberation from Japanese camps, mostly in Thailand. Many articles on the sufferings of these men have been written, and numerous reports of their medical condition have been given, mostly by the medical officers who organized their care so well under such extremely adverse conditions. A symposium on this subject has been presented by several workers (Proc. Nutrition Soc., 1946).

The men seen in Rangoon had been in captivity for three and a half years. Some of them had taken part in the building of the Burma-Thailand railway, and others had helped to construct the notorious Mergui road. One patient who was employed on this latter project stated that of the original number of a thousand in his party, approximately 400 men had died.

The men examined were a selected population in that the most ill patients had been retained for treatment in Thailand, and because a large number of

cases of amblyopia were concentrated in the ward in which the investigation was carried out. Accounts of the sufferings of the men have been given by Warrach (1946), Markowitz (1946), and Robins (1948), amongst others.

Major H. Tanner (R.A.S.C.) supplied the official diet scale of a camp in Thailand shown in Table XIII. In addition there is recorded the average daily weight of foodstuffs actually received and secretly weighed during the period 26.11.42 to 10.3.43.

TABLE XIII.—FOOD SUPPLIED TO EUROPEAN PRISONERS IN A JAPANESE P.O.W. CAMP

	<i>Official daily scale</i> (Grammes/day/man)	<i>Food actually received</i> (Grammes/day/man)
Vegetables	500	75
Sugar	20	16
Salt	20	12
Oil	5	4.5
Fish	50	16
Meat	100	32
Tea	3	nil
Rice	750	750

It should, however, be noted that sick persons were given less food than fit ones, and that much of the food was bad when issued. The officer giving this report was of the opinion that many lives were saved by ducks' eggs supplied by the natives of Thailand. This diet scale may be compared with that given by Massey (1946).

ILLNESSES DURING IMPRISONMENT

One hundred and eighty men were questioned about illnesses from which they had suffered during captivity; it should be remembered that these records pertain to the fortunate survivors of the period of imprisonment. Malaria was the commonest disease, and 154 men stated that they had had malarial attacks, in many cases as often as forty or fifty times. The other diseases are shown in Table XIV against the years in which they occurred, except that with œdema and beriberi only the first year in which this occurred is recorded.

TABLE XIV.—DISEASES SUFFERED BY EUROPEANS IN JAPANESE P.O.W. CAMPS (180 MEN)

	1942	1943	1944	1945	<i>Total No. of attacks</i>
Edema	19	32	7	4	62
Pellagra	8	22	14	5	49
Dysentery, probably bacillary ...	20	16	4	3	40
Dry beriberi	8	17	7	2	34
Dengue	10	14	7	2	33
Jaundice	1	9	11	10	31
Dysentery, probably amœbic ...	6	10	8	2	26
Diarrhœa	9	8	4	2	23
Scrotal dermatitis	6	14	2	—	22
Dysentery, type uncertain ...	3	13	4	—	20
Cholera	—	5	1	1	7

	1942	1943	1944	1945	Total No. of attacks
Cerebral malaria	—	2	2	1	5
Fractured limbs	4	1	—	—	5
Gastric symptoms	—	3	—	2	5
Hookworm infestation	—	—	2	3	5
Cardiac beriberi	—	2	2	—	4
Pneumonia	—	2	1	1	4
Corneal ulcers	3	1	—	—	4
Typhus	—	1	1	2	4
Renal colic	—	2	—	1	3
Bronchitis	1	1	—	1	3
Conjunctivitis	1	1	1	—	3
Erysipelas	—	2	1	—	3
Otitis media	1	—	1	1	3
Anæmia	—	—	1	1	2
Cystitis	1	—	—	1	2
Appendicitis	—	1	1	—	2
Cellulitis	—	2	—	—	2
Acute rheumatism	2	—	—	—	2
Diphtheria (faucial)	2	—	—	—	2
Mental derangement	—	1	—	1	2
Lumbago	—	1	1	—	2
Pyrexia of unknown origin	—	1	1	—	2
Hip abscess	—	1	1	—	2
Blackwater fever	—	1	—	—	1
Heat stroke	—	1	—	—	1
"Spastic syndrome"	—	1	—	—	1
Hæmorrhoidectomy	—	—	1	—	1
Synovitis	—	—	1	—	1
Herpes zoster	1	—	—	—	1
Meningitis	1	—	—	—	1
Tonsillectomy	—	1	—	—	1
Relapsing fever	—	1	—	—	1

In view of the number of articles already written on the subject, detailed comments about these illnesses will not be made. The condition of "burning feet," a polyneuropathy with pain and burning of the feet associated with vitamin deficiency, has been referred to by Bennet (1946). Cruickshank (1946) has described a spastic syndrome, an upper motor neurone lesion that affected the legs and sometimes one or both arms. The extent to which œdema was due to beriberi as opposed to famine œdema is uncertain, but it appears that both factors played a part. As Murgatroyd (1946) has recorded, the œdema increased in some patients when the diet improved.

CLINICAL CONDITION OF THE RELEASED PRISONERS

One hundred and eighty men were examined just after release, and the positive findings, other than the ocular abnormalities, were shown in Table XV. The general condition of the men was good on the whole, there was no abnormality of blood pressure, and the hæmatological findings on a hundred of the patients was as recorded in Table XVI. At another hospital, however, some men were seen who had been working on the Mergui Road

right up to the time of the capitulation. They were very ill, and some were suffering from severe malnutrition with anæmia.

TABLE XV.—ABNORMALITIES FOUND ON EXAMINING 180 RELEASED PRISONERS

<i>Diseases</i>	<i>No. of patients</i>
General	
Partial nerve deafness	5 (4 had amblyopia)
Œdema of the legs	2 (Plasma proteins normal)
Acholuric jaundice	1 (Familial)
Pain in the tongue	nil
Atrophy of tongue papillæ and fissures	18
Angular stomatitis	20
Scrotal dermatitis	nil
Abdominal	
Abdominal distension	in the majority
Liver palpable	13 (5 had jaundice history)
Liver tender only	2
Spleen palpable	13
Abdominal tenderness	3
Indigestion	10
Flatulence	8
Varicocele	1
Hydrocele	1
Chest	
Active pulmonary T.B.	1
Rhonchi	6
Chronic laryngitis	1
Asthma, acute	1
C.N.S.	
Reflexes brisk	20
Reflexes very brisk	3
Knee and ankle jerks absent	2
Knee and ankle jerks sluggish	3
Sensory loss in legs	2
Tender calves	2
Rombergism	2
Cardiovascular	
Systolic apical murmur	7
Aortic incompetence; mitral stenosis	1
Skin	
Lichen planus	1

TABLE XVI.—HÆMATOLOGICAL FINDINGS IN 100 RELEASED PRISONERS, MANY WITH AMBLYOPIA

<i>Hæmoglobin distribution (grammes per cent)</i>							
	10-11	11-12	12-13	13-14	14-15	15-16	16-17 17-18
No. of patients	2	2	6	6	19	29	27 9
Mean 15.216 grammes per 100 ml.							
<i>Red cell distribution (millions per c.mm.)</i>							
	3-3.5	3.5-4.0	4.0-4.5	4.5-5.0	5.0-5.5	5.5-6.0	
No. of patients	2	7	17	27	33	14	
Mean 4.861 million/c.mm.							

No. of patients	P.C.V. distribution (per cent)					
	25-30	30-35	35-40	40-45	45-50	50-55
	2	3	13	47	33	2
	Mean 43.099 per cent					
	White cell mean 9,150 per c.mm.					
	M.C.V. mean 88.7 cubic microns					
	M.C.H.C. mean 35.3 per cent					

AMBLYOPIA

Of the 180 men examined, 77 suffered from amblyopia. These men had been specially selected for admission to the ward, and were examined by Major H. Ridley, for visual disturbances. He has given an account of their condition (Ridley, 1945). The visual acuity of the 154 eyes examined were as shown in Table XVII. Examination of the optic discs showed atrophy in 27 eyes, temporal pallor in 67, doubtful pallor in 24, and pseudopapillædema in 4. The fields of vision showed a central scotoma in almost all cases, greater for blue than for white, and slit-lamp examination revealed that the fine capillary plexus at the limbus was increased in extent, and that there was a variability in the size of these capillaries with the appearance of aneurysms.

TABLE XVII.—VISUAL ACUITY OF 154 EYES IN 77 PATIENTS WITH AMBLYOPIA

No perception of light	...	1	5/60	1
Perception of light	...	1	6/60	42
Fingers visible	...	2	6/36	35
Less than 6/60 vision	...	7	6/24	22
1/60	...	4	6/18	11
2/60	...	4	6/12	4
3/60	...	10	6/9	6
4/60	...	2	6/6	2

The time when the amblyopia was first noted by the men is given in Table XVIII. Occasionally the loss of vision occurred in the course of an illness such as dysentery or cholera, but in most cases there was no evidence of a precipitating cause. A man might be able to read a book one day and not the next, or the amblyopia might develop much more gradually over a period of weeks or months.

TABLE XVIII.—DATE OF ONSET OF AMBLYOPIA IN 77 PATIENTS

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Patients
1942	—	—	—	—	1	2	2	2	2	1	9	7	
1943	2	6	4	2	3	5	8	3	8	3	—	—	
1944	—	1	—	—	1	—	2	—	—	1	—	1	
1945	—	1	—	—	—	—	—	—	—	—	—	—	

These men were treated with ten multivitamin tablets and 6 mg. of thiamine hydrochloride daily by mouth, and 8 c.c. of crude liver extract daily by injection this last being given for a period of six days. In addition they received suppressive mepacrine, and graduated dietetic treatment. 47 per cent

of them showed slight improvement in visual acuity (ability to read one more line), and 20 per cent showed definite improvement (ability to read two or more lines) following this therapy.

Comprehensive reviews of this condition of amblyopia have been made by Denny Brown (1947) and Spillane (1947). Garland (1946) doubted whether it could be due to deficiency either of vitamin B₁ or of vitamin B₂. Reed (1947) wondered whether it was due to a toxin, to infection, to dietary deficiency, or to a combination of such factors. Shapland (1946) did not consider that starvation was a sufficient explanation but attributed the condition to a diet of excessive amounts of rice with insufficient vitamin B₁ to metabolize it.

SUMMARY

An account is given of patients seen at three hospitals in India and Burma during the campaigns against the Japanese. These are representative of the types of medical conditions seen in the Far East during the campaigns. Reference is made to many of the papers that have already been published about the medical condition of troops taking part in this theatre of operations.

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THE TRAINING OF FIELD MEDICAL UNITS

BY

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Late Royal Army Medical Corps

(Continued)

VI.—GENERAL MILITARY KNOWLEDGE

MEN who have been trained for some time on the lines described in the previous section, especially if they have been able to practise desert and mountain navigation, should be able to find their way about in most country with confidence by day or night, but they will not be really sound Field Ambulance men unless they have some knowledge of the topography of a battlefield. This can, of course, best be acquired by battle experience, but before men can really profit by such experience they must know a lot about the composition, command, and administration of the kind of formation with which they are serving and how it is deployed for battle. It was in this sphere of general military knowledge that ignorance amongst officers and other ranks was usually most noticeable, and in most Field Ambulances far too little of this sort of teaching was given. It is important in this as in all branches of our training to impress upon the trainees what one is aiming at, and why one expects them to work hard in acquiring this general knowledge; and such arguments as the following can be used.

The collection and transmission of **INFORMATION** is so important in battle that it should be prescribed in Unit Standing Orders as the duty of every officer and man. Medical personnel cover so much of the territory of any formation in action, their daily duty involving many journeys from front to rear that, if they are trained in intelligent observation, the information which they can bring back may be of great value not only to their Commanding Officer, but also to Intelligence officers. If they are ignorant of the topography of a battlefield and of the organization of the formations engaged they will not only tend to lose their way themselves but will return to their Headquarters with such hazy ideas that any information which they bring will be valueless. Constant teaching and practice in informed observation on all marches and schemes results in good Intelligence in battle. Difficult then though it is to attain a high standard of general military knowledge it is most important to aim as high as possible and success in such teaching brings a sure reward, since only men who know how to find their way round a battlefield can be expected to be much use in action, to show initiative, to give accurate reports of what they have seen and done, or even indeed to carry out their work without unnecessary danger to themselves or to the patients in their care.

Throughout training it should be borne in mind and emphasized to all ranks that once battle is joined the A.D.M.S. and the Commanding Officers of Field Ambulances, who have laboured to perfect their plans for the collection and evacuation of casualties, can exert little further influence on the execution of their plans, beyond ranging the Divisional area using their experience and common sense, and sometimes their rank, to keep things going and to smooth out the muddles which inevitably occur in the confusion of a battle, and making decisions about any changes in the medical plan which may be made necessary by the reaction of the enemy and the progress of the operation. At any time the success of their plans, and indeed the reputation of the Divisional Medical Services, may rest in the hands of a single dispatch rider, ambulance driver or R.A.M.C. private soldier, and may thus in fact depend upon how well they have trained their units, and not only the officers and N.C.O.s but every man. This sobering reflection should not only encourage officers and N.C.O.s to spare no efforts in training their men, but it should impel the men themselves, or at least those with any sense of responsibility, to do their best to absorb the teaching which is given to them.

It is in any case a kind of teaching in which they will usually take great interest, since no one likes to be in a battle without knowing what it is all about. It is an accepted principle nowadays that every man must be "in the picture" and only the dumbest minds need much persuasion as to the value of knowledge which enables them to understand such briefing. Men who do not understand a battle tend to pick up battlefield gossip which they repeat when they return to their Casualty Collecting Post or Dressing Station, often with their own additions which accentuate the elements of peril or even of disaster in order to magnify their own daring and the hazards which they have survived. Thus they may very easily contribute to a lowering of morale, especially if their audience is too ignorant to evaluate the true meaning of their stories. An example of this effect which I experienced impressed me with the need for making it an order that men would not repeat such battlefield gossip of a depressing nature, but it is far more important to give them such an understanding of a battle that they can assess things at their proper value. Few of our race, even the most unwilling conscripts, are without some military ancestry and instincts, some perhaps unconfessed pride in the profession of arms, and most of us would like to imagine that we have an understanding of a battlefield, and that when engaged in battle we are not mere unthinking pawns, but are to some extent "in the know": so I am sure that the men of any Field Ambulance can be persuaded to take an interest in much more detailed instruction in such affairs than they are usually given.

THE DIVISION: COMPOSITION, COMMAND, AND ADMINISTRATION

For teaching the Composition, Command, and Administration of a Division a lecture on the following lines may be given.

A Division is the largest fighting formation in the British Army of which the establishment is fixed—or as fixed as anything in this changing world, for

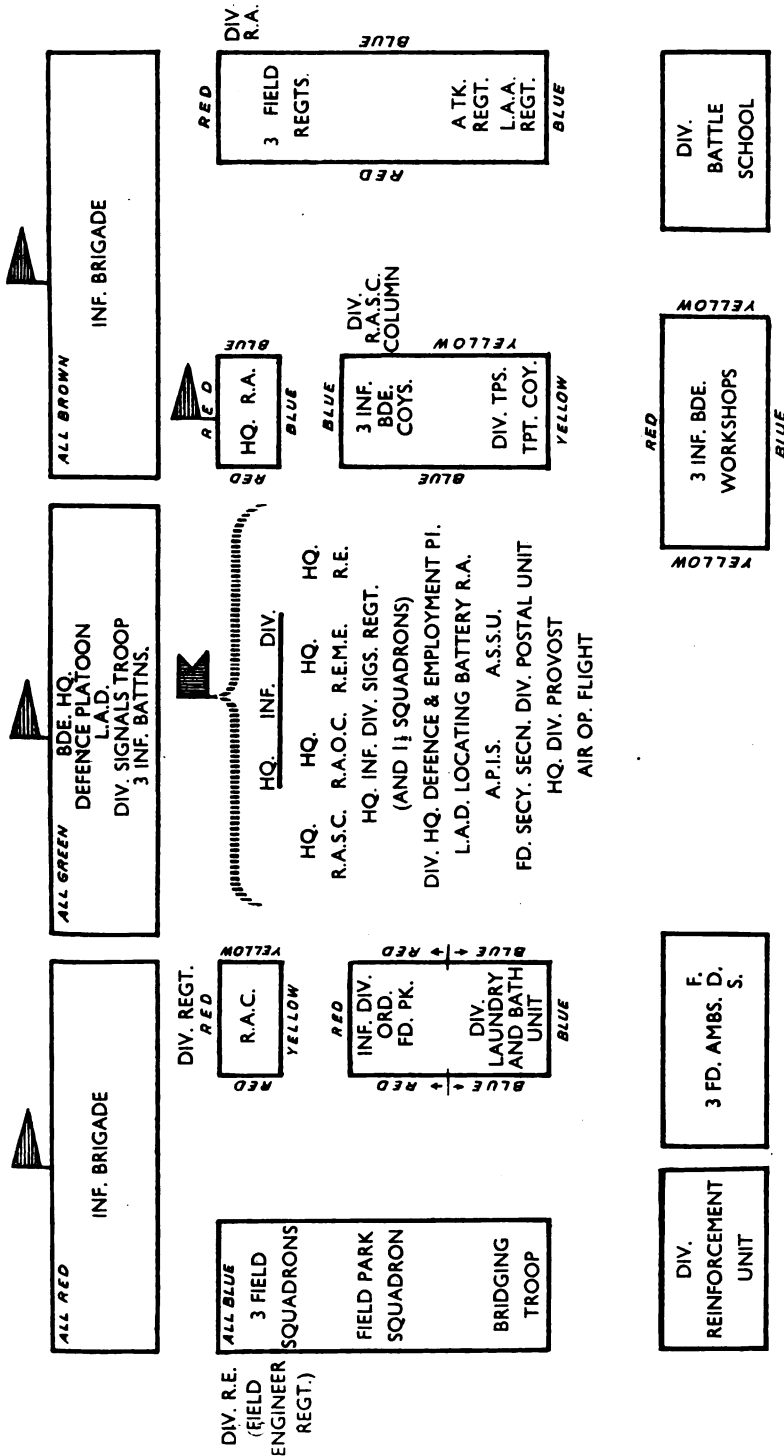


Diagram of an Infantry Division

one often finds that the late night final has made inaccurate a diagram based on the sports edition. Except for units serving in Independent Brigade Groups, or under the direct command of higher formations, Field Ambulances are divisional troops, so that a knowledge of the composition of a Division must be our first step to the understanding of a battlefield.

The diagram should be built up step by step on the blackboard, members of the audience being asked at each stage to name the arm of the Service which is next to be added. Taking first the Infantry one puts on the board the three Brigades, colouring them red, green, and brown, because it is upon these colours that the unit vehicle markings and unit signs of the three Battalions and of the Headquarters of the Brigade are painted. One of the Brigades is then split into its component parts with a brief description of the composition of an Infantry Battalion and of Brigade Headquarters. As each arm of the service is added (in the appropriate colours of its vehicle markings if possible, e.g. blue and yellow diagonals for the R.A.S.C.) the units of that arm included in the Division and their functions are briefly described; and finally Divisional Headquarters and its ancillary units are added.

At this stage the tactical numbers which, together with the Divisional sign, each unit has upon its signs and for its vehicle markings, should be described, and also the further distinguishing signs of Squadrons or Companies, which may be drawn on the board.

Although these tactical numbers are temporarily in abeyance it can be assumed that something of the sort will be used in future wars, and it is worth mentioning a few of the important ones formerly used—e.g. 81, 87, and 94, on red, green, and brown backgrounds respectively, being the numbers of the three Infantry Brigade Headquarters in that order of seniority. A knowledge of these tactical signs was ESSENTIAL to finding one's way round a battlefield, and Field Ambulance men must know all the signs of their own Brigade group, and certain other important ones. Formations advance and fight on and around an AXIS OR CENTRE LINE, which is cleared and signed as the troops advance. Supplies and D.R.s, etc., go forward by this route; casualties come back by it. The Divisional Axis is marked with the Divisional sign, Brigade Centre Lines with the Divisional sign and the tactical number of the Brigade Headquarters.

Next the Commander and his staff are dealt with, and members of the audience are asked for the names of important officers, with their rank badges, and distinguishing flags or pennants.

The functions of the Staff should then be described beginning with the military members of the Army Council and describing the progressive amalgamation of the duties of the "A" and "Q" branches of the Staff as one passes to lower formations until one reaches at Brigade Headquarters the D.A.A. and Q.M.G., whose functions and title, and how he differs from the D.A.Q.M.G. at Divisional Headquarters will thus be made clear.

When discussing the Staff officers who assist the "G.I." and the "A.Q." the

D.A.A.G. (Health Discipline) who would be on the establishment in certain theatres of war, must not be forgotten.

The C.R.A., C.R.E., C.R.A.S.C., C.R.A.O.C., and C.R.E.M.E., with their separate establishments at Divisional Headquarters will be contrasted with the A.D.M.S. and his staff, who are attached to Divisional Headquarters. The advantages of this arrangement may be mentioned, the chief one being perhaps that whereas in all enlightened Divisions the A.D.M.S. and his staff were located at Main Divisional Headquarters during battle, it would be very likely that, if he were to become the C.R.A.M.C. with a separate and necessarily bulkier establishment, he would be relegated to Rear Headquarters. We differ from the other Services in that we collect our casualties from the front and pass them to the rear, whilst the R.A.S.C. and R.A.O.C. bring supplies from the rear and pass them to the front; and, although the R.E.M.E. problem in so far as it concerns the evacuation of vehicle casualties resembles ours, their Workshops are usually set farther back than our A.D.S.s and their forward organization does not perhaps need such close supervision as do our C.C.P.s and R.A.P.s at which everything may change from success to disaster with alarming rapidity. Thus having won the right to be at Main Headquarters, where the A.D.M.S. can discharge his functions most satisfactorily, it would be unfortunate to allow any reorganization to prejudice our location there. A few words in explanation of why only the "G.I." and the "A.Q." can sign "for" the Divisional Commander, whilst the A.D.M.S. can sign letters relating to medical policy which are intended only for his medical officers and medical units, may help to clarify an understanding of the duties of the Staff.

The A.D.M.S. and his Staff, vehicles, etc., should finally be described. This lecture can be made a great deal more interesting than it sounds, and, if my experience is any guide, the answers which will be got from the audience will prove the need for such a lecture in the preliminary clearing of the ground for the further talks on the battlefield. The whole lecture can easily be got through in an hour, including time for questions. A diagram with some explanatory notes based on the foregoing description should be permanently exhibited in the Information Room or Training Room of the unit.

THE DIVISION: DEPLOYMENT FOR BATTLE

It is, of course, much less easy to show diagrammatically the layout of the Division for battle.

The modern battlefield presents a more confusing picture than in the days when opposing Armies lined up opposite one another, and after some preliminary shouting of insults at the Enemy and of encouragement to "Own Troops," advanced resolutely upon one another, sidestepping the occasional bounding cannon ball, and hacked away until one side bolted. It is as impossible to put on the blackboard a diagram of an embattled modern army as it is to make a diagram of the Heavens showing the stars and constellations in fixed places above our heads. But just as the stars preserve constant positions relative to

one another, and move around the Earth in accordance with unalterable rules which enable those who understand them to know where to expect to see them at different times and seasons, so there are certain general rules governing the deployment of Divisions, and certain signs by which the well-trained, and still more the experienced man, may find his way with confidence around a battlefield. Thus in "Battle Astronomy," to coin a phrase, the altered positions imposed upon the stars and constellations by season, time, and latitude are represented by the different methods of deployment for such operations as desert or mountain warfare, river crossings, or combined operations. Knowledge of the shape of constellations and of the appearance of stars and planets is represented by memorization to the point of instinct of the tactical numbers of units or formations, and by the knowledge of those little indefinable differences in layout and pattern of different formations by which the recognition of the Division through whose territory we are passing eventually becomes almost "second nature."

The following might be the Laws of the science of "Battle Astronomy," and all officers and as many N.C.O.s and other ranks as possible should be well versed in them.

- I. Know the ORDER OF BATTLE of the Division by heart, and keep amendments up to date.
- II. Know the NORMAL GROUPING within the Division.
- III. Know by heart all Formation and unit TACTICAL NUMBERS.
- IV. Understand the current SYSTEM OF SUPPLY in the Field.
- V. Know by sight, and personally if possible, all ADJUTANTS and JUNIOR STAFF OFFICERS, and where they are normally to be found.
- VI. Be able to READ A MAP, anywhere and in any conditions, in a car, on foot, by day or night, in snow or rain; and of course ensure that the map is marked and up to date, as in I above.

A few words might be said in explanation of these "Laws."

I and III have already been discussed in the lecture on the Composition of the Division. In giving that lecture to men who are members of a Division the actual units comprising it would be mentioned, and they would be encouraged to learn these by heart, and to know the tactical numbers of as many units as they can, or at least those of most importance to them, such as those of their own Brigade, of the Headquarters of the other two Brigades, because they are used to mark their Centre Lines, of all the R.A.S.C. Companies, and of the M.A.C. of the Corps in which their Division is serving at any time. When one first joins a new Division it is a good plan to have a list of these typed out for one's pocket book (remembering that it must be treated as a secret document) and to catechize oneself on it daily. No single aid is of more value than this memorization of tactical numbers and unit vehicle markings, and Law III might have been put first except that it seems logically to follow I and II.

Knowledge of the Normal Grouping referred to in Law II implies knowing which Field Regiment R.A., Field Squadron R.E., R.A.S.C. Company, and

Field Ambulance, are normally with each Brigade, and knowing the tactical numbers at least of those normally in the same Brigade Group as one's own unit.

For Law IV (System of Supply) the general principles may be found in R.A.S.C. Training manuals, but the application of them may differ in different formations and it is best to have the lecture on this subject given by the unit transport officer, the Brigade supply officer, or the D.A.A. and Q.M.G. of the Brigade. It is useful to know the System of Supply in the field as supply echelons are always moving up and down the battlefield according to a carefully prepared programme, and a meeting with such a convoy of R.A.S.C. vehicles bearing a certain tactical number may give a clue to one's position or to that of a unit or formation which one wants to visit. The assistance of such vehicles when returning empty may often be invaluable for the evacuation of lightly wounded casualties. The possibility of using them is always kept in mind, and can best be included in our plans if we know something of their normal duties.

The knowledge prescribed in Law V (Personal knowledge of officers) enables one to ask sensible questions from a friend and is as important for other ranks as it is for officers, since if they get lost they will be greatly helped by knowing the names and locations of those from whom they can get advice. Of course they should be encouraged to choose their time for asking for such help and advice, and if possible to get it from others rather than to bother busy Staff officers, from whom they must not expect too much. They may also be advised not to ask for information from the Military Police when on point duty.

Law VI (Map Reading) has been sufficiently dealt with previously, and it need only be remarked that the help of a well-trained Intelligence clerk is invaluable in keeping one's maps marked and up to date, and during training men should be instructed in this duty.

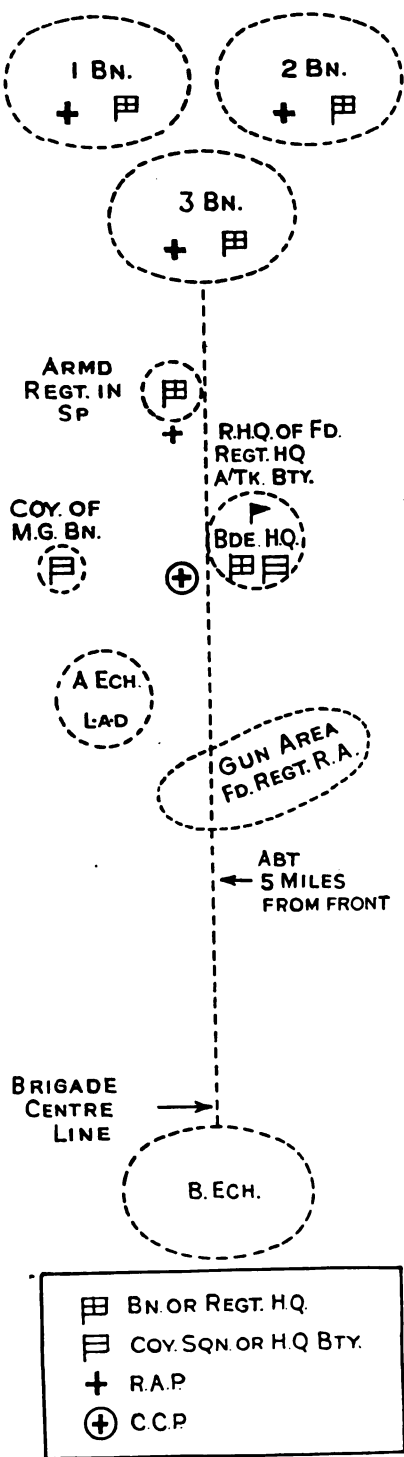
Formations in action tend to be fairly fluid, but always tend to exhibit the common factor of the Divisional Axis, with Brigade Centre Lines concurrent with or divergent from it. Signs of Divisional units will be found branching off the former, and of Brigade units branching off the latter. Thus men who know these signs by heart cannot go far astray.

It is important that members of Field Ambulances should have some knowledge of booby traps and minefields, and how the latter are marked, and, when cleared, the signs which denote the lanes through them. Some member of the Brigade staff or perhaps of the Field Squadron R.E. should be asked to lecture on this subject.

THE BATTLEFIELD

A lecture on the following lines describing a day's journey round a Division in a defensive position will contribute to an understanding of this subject.

The journey to be described is one from the C.C.S. to a Battalion in the



INFANTRY BRIGADE DEPLOYMENT

- The diagram represents a situation during the advance to the Elbe. A brigade of 15 (S) Div encountered considerable opposition in a village where a bridge was blown. After a hard engagement the village was taken but enemy opposition remained firm, and the Bde adopted the layout shown here pending further orders.
- The Bde Group consisted of
 - Bde HQ, Defence Platoon, and L.A.D.
 - 3 Inf Bns.
 - Supporting Arms: Fd Regt R.A.; Coy of Machine Gun Bn; A Tank Regt; Anti-tank battery; Squadron of Div Recce Regt now called Div Regt R.A.C. not shown on diagram.
 - A Fd Amb.
- Brigade HQ is not split into MAIN and REAR. When fairly static one HQ was normal. On occasions, especially when Bde is mobile, Tac HQ may be separated from Main.
- A Echelon is brigaded, under the Brigade Transport officer, and as many as possible of the Inf Bn soft vehicles remain here. Cooking may be done here for Inf Bns if it is not suitable to do it in forward areas.
- B Echelon is further back in the Divisional Administrative area. B Echelons of Battalions probably under their Quartermasters.
- SUPPORTING ARMS.

Field Regt R.A.: HQ will be near Bde HQ; Gun area further back: Battery HQs and 2 F.O.O.s will be with each Inf Bn.

Anti-tank Arty: One Bty of Div Anti-tank Regt: Bty HQ near Bde HQ; Guns deployed in Inf Bn areas.

Machine Guns: One Coy of Div M.G. Bn: 2 Pls forward in support of Inf Bns: 2 Pls with Coy HQ near Bde HQ.

Note Div M.G. Bn now obsolete.

Recce Squadrons of Div Recce Regt doing maintenance ready to move forward when front becomes fluid.

Tanks: A Regt of 6 Guards Tank Bde under command and in support of the Division. During advance one Sqn was with each Bn. When position became static Regt went back to rear rally leaving an L.O. with each Inf Bn.
- Field Ambulance. Under control of A.D.M.S., but very desirable to let it be firmly affiliated to Bde and get to know all Bde units.

senior Brigade of an Infantry Division in the line, where we want to visit the Regimental Medical Officer.

Leaving the C.C.S., which may be serving one or more Divisions, we look for the Axis of the Division, which will be marked with the Divisional sign. Following this we may pass various Corps units such as R.E.M.E. Workshops and the Headquarters of the Corps M.A.C., before reaching the Divisional Administrative Area. The initials M.A.C. which formerly meant Motor Ambulance Convoy are retained to signify Motor Ambulance Company—the modern unit being a R.A.S.C. Company (Motor Ambulance).

In the Divisional Administrative Area we will see the signs of Rear Divisional Headquarters, of the C.R.A.S.C., and of the R.A.S.C. area which may be dispersed in open country or perhaps occupy a small village with many intersecting roads allowing of the necessary traffic circuits. We may see the Ordnance Field Park, and one or more R.E.M.E. Infantry Brigade Workshops, and we may also see the signs of many Battalions including the one for which we are looking, but with “B ECH” underneath them. Here at the unit’s B Echelon we might find their Quartermaster, and it might be helpful to turn in and see if he has any mail or supplies such as First Field Dressings to send to the R.A.P. At Rear Divisional Headquarters we might find the D.A.D.A.H. who may be sharing an office, perhaps in a Command Vehicle, with the D.A.A.G. (Health Discipline). The D.A.A.G. of the Division would normally be the Staff Officer at Rear Headquarters who is concerned with the Medical Services. Medical posts in this area might consist of the Divisional F.D.S. and at least one R.A.P. to serve the Divisional Administrative Area and Rear H.Q. The function of the F.D.S. is to treat the minor sick and any cases of exhaustion of the Division and so to reduce sick wastage out of the Divisional area. It is sited more according to the availability of suitable accommodation than to tactical considerations; suitable cases will be filtered into it from the Reception Department of the A.D.S.

The R.A.P. for the Divisional Administrative Area will be staffed by one of those R.M.O.s whose units do not need them in battle to the same extent as do the Battalions and Regiments. These “spare M.O.s” are those of the Divisional R.E., Light Anti-Aircraft and Anti-Tank Regiments R.A., Signals Regiment, and R.A.S.C. Squadrons, Batteries or Companies of these units are usually attached to Brigade Groups and are cared for by the R.M.O.s of the nearest Battalions. The R.M.O. of the Divisional R.A.S.C. frequently runs the R.A.P. for the Divisional Administrative Area.

As we motor on along the Divisional Axis we may see quite a variety of signs of units which do not belong to the Division. These may include those of Army Groups. Royal Artillery, Heavy and Medium Regiments R.A., Armoured Brigades or Armoured Regiments, if such units or formations are temporarily under command or in support of the Division. Other birds of passage, according to the nature of the operations in progress or impending, may include Special Armoured Regiments such as Regiments of L.Vs.T.

(Landing Vehicles Tracked—"Buffaloes" or "Neptunes") for a River Crossing, A.P.C.s (Armoured Personnel Carriers—"Kangaroos"); Flail and Fascine Tanks, and so on, for a break through of a defensive area. However, we are not afraid of losing our way whilst we are following our guiding star, the Divisional sign marking the Axis, and in about five miles or so we reach Main Divisional Headquarters. Here would be the A.D.M.S. and his D.A.D.M.S., and also the staff officer concerned with the medical services, the A.A. and Q.M.G.. An R.A.P. here might be staffed by the Medical Officer of the Divisional R.E. or the Divisional Signals Regiment. In and around the area of Main Divisional Headquarters we will see such signs as those of H.Q. R.A., H.Q. R.E., H.Q. Divisional Signals Regiment, Headquarters of the Light Anti-Aircraft and Anti-Tank Regiments R.A., the Divisional Provost Company, and one or more Field Squadrons R.E. From now on we may expect to see the signs of Brigade Headquarters marking their Centre Lines, and we look for the one which we want, which our knowledge of tactical numbers tells us will be 81 on a red background, the R.M.O. having told us that his unit's number is 56 on a red ground. (It is of course only possible at present to use the wartime serial tactical numbers, which, although now obsolete, serve to illustrate the method of finding one's way about.)

Other units which one may pass as one goes on are Field Squadrons R.E., the Headquarters of the Divisional Regiment R.A.C., with its R.A.P., the Mobile Laundry and Bath Unit, and the A.D.S., which will be somewhere in the vicinity of Main Divisional Headquarters. It would be advisable to call at the A.D.S. because if things are fairly quiet the R.M.O. whom we are seeking may himself be paying a visit there to enquire about the progress and disposal of the casualties from his unit, and to ask if the M.O. at the A.D.S. is satisfied with the treatment which they are getting at the R.A.P., and with the condition in which they are arriving. R.M.O.s should be encouraged to pay visits to the A.D.S. and to regard themselves as part of the Field Ambulance team. Sometimes R.M.O.s made a practice of sending a clerk occasionally to the A.D.S. to check up on their casualties, which is also a good habit. If the R.M.O. is not at the A.D.S. we may be able to take him a message or supplies, and in any case the visit affords us a welcome excuse for the usual cup of hot tea. A similar visit may be paid to the Brigade C.C.P. which is not of course necessarily part of the same Field Ambulance as the A.D.S., but which our knowledge of the Normal Grouping tells us will have the signs "C.C.P. 75" with the Divisional sign and the Geneva Cross. We will expect to find the C.C.P. a few miles forward of Main Divisional H.Q. on its Brigade Centre Line, or near to it with signs on the Centre Line, and fairly near to Brigade Headquarters. Now, if we want to ensure that our visit will not be unpopular, we should ask the Field Ambulance Company Commander, or M.O. in charge of the C.C.P. or perhaps even better the D.A.A. and Q.M.G. or Staff Captain at Brigade Headquarters if we *may* visit the R.A.P., and if there are any restrictions as to time, route, where we should

leave our car and go on on foot, and so on. Only the ignorant would omit to make some such enquiries in the circumstances which we are envisaging—i.e. a Division in a Defensive position.

The R.A.P. will be near to Battalion Headquarters and cars driving up to this area, raising dust, may ruin the effect of days of careful camouflage and concealment and bring down artillery fire which may imperil the whole operation. No one is more unpopular than the idiot from the relative safety of the rearward areas who likes to show his fearlessness by boldly exposing himself near Battalion Headquarters, or even worse near artillery Observation Posts; for after he has departed in a glow of self-satisfaction feeling that he has contributed to the morale of the forward troops, a shower of shells and mortar bombs may envelop his memory in stink or even in slaughter. So obey all local restrictions, however unnecessary they may seem to you, for they have been imposed by those who know from bitter experience, and they may even save your own skin.

Resuming our journey from Brigade Headquarters or the C.C.P. we pass the gun area of the Field Regiment R.A. of the Brigade group, with the tactical number 42, and also perhaps "A Echelon" of the Battalion, or of all three Battalions brigaded under the Brigade Transport Officer. Here if it were an Armoured Division would be the M.O.'s "thinned skinned" vehicles, and in an Infantry Division we may find here according to the nature of the operation and the wishes of the Battalion C.O. the M.O.'s truck and the ambulance attached to his R.A.P., if it is liable to be disabled by fire nearer the R.A.P. itself. The R.M.O. of the future should have an armoured ambulance, and probably also, as in the past, an ambulance attached to him from the Field Ambulance. He might well leave the latter at a Car post some distance from his R.A.P. and send cases to this post either by hand carriage, the armoured ambulance, or by his stretcher-carrying jeep. It would usually be best to site such a car post at a place to which all unit drivers already know the way, and the Battalion's A Echelon is a likely place for it.

We are now proceeding with caution and with due observance of what we learned under Visual Training of Camouflage and Concealment. We avoid sky lines, try not to raise dust, or to let the flash of the sun on our windscreen be seen, park our vehicle to fit into the pattern of the countryside as seen by an air observer, thinking always in terms of the vertical view, and making intelligent use of cover and of shadow. We should also know how minefields and the gaps cleared through them are marked, and we only leave the beaten track with caution. Further on, the track which we should follow may be marked with white tape. Finally, following our track marked 56, which may be the same as the track marked 81 or a branch of it, we reach the neighbourhood of Battalion Headquarters near which will be the R.A.P. and perhaps the Headquarters of the Battery of the Field Regiment R.A., with one or two Forward Observation Officers, and of a troop of the Divisional Anti-Tank Regiment R.A. We should see several directing signs to the R.A.P. in the

Battalion area. Battalion H.Q. and the R.A.P. will vary widely in appearance from a camouflaged dugout or a collection of officers such as the C.O., Adjutant, and Intelligence Officer, with runners, signallers, etc., sitting in a ditch or behind a high bank with some vehicle camouflage nets well garnished with branches, etc., as their only cover, and nearby their individual slit trenches, to a collection of suitably camouflaged and perhaps dug-in vehicles, a jeep or two and a wireless vehicle, or the cellar of a house or shop reinforced with sandbags, with the Battalion Headquarters staff working underground by candlelight in a scene reminiscent of pictures of the First World War.

Although it may be of little importance to us to know how the Battalion is deployed the R.M.O. and his stretcher bearers must know this. We do not expect to see a "thin red line" or a row of front-line trenches, for Infantry hold ground not with men but by fire. An area will have been allotted to the Brigade by the Divisional Commander and sub-allotted to the Battalions by the Brigade Commander at an Orders Group at which perhaps one C.O., noting from the map certain difficult features of his area may have been relieved of some part of it, the area of another Battalion being proportionately increased. C.O.s then apportion their areas amongst their Rifle Companies, the supporting arms of the Battalion being disposed amongst them according to the ground and the Fire Plan. Similarly, of course, the supporting arms of the Division are spaced out amongst Brigades according to the fire plan and the ground into which the Divisional Commander is not prepared to accept enemy penetration.

On our way home we may visit the Squadron of the Divisional Regiment R.A.C. doing maintenance in the Brigade area, ready to move forward when the front again becomes fluid, for of course during this journey the Division has been in defence, or we would not have got along the roads so easily. We may pass the Battalions' A Echelon vehicles coming forward to their units bringing them a cooked meal from the A Echelon area if it has not been possible to cook in the Battalion areas. After leaving the "Red" Brigade's locality we may look for the signs of another Brigade in order to follow its Centre Line and visit the Headquarters of its Field Ambulance which is in reserve. Whether it is the "Green" or the "Brown" Brigade, with tactical numbers 87 or 94, we will find that it has its C.C.P. open somewhere near Brigade Headquarters, with its signs "C.C.P. 76 or 77."

As we motor back from the forward areas we may, and in fact if we are the O.C. of the M.A.C. Platoon, the A.D.M.S. or D.A.D.M.S., with responsibilities for the smooth working of the system of evacuation, we must observe carefully whether the route from forward units to the C.C.P.s, A.D.S. and C.C.S. is clearly signed, and the units themselves easy to find by day and night.

THE BATTLE

The sequence of events in a battle varies so widely that of course any lecture can give only a very sketchy outline, but it can be made quite interesting if illustrated from actual experience.

For a major battle such as an attack on a strong defensive position, an opposed landing, or the assault crossing of a big river, planning may last for days, weeks or months. During this **PLANNING PHASE** all branches of the staff are involved in detailed calculations and discussions of how their part is to be played to fit in with the general plan made by the "G" branch of the Staff, and adapting their preparations to the changes of plan which may result from changes in availability of men or equipment, from varying information about the enemy from the Intelligence branch of the "G" Staff, and even on occasions from political or inter-allied considerations. The medical staff at Divisional Headquarters must make quite sure that they really understand the plan, and when a first consideration of their medical plan raises points about which they need clarification, confirmation or the practicability of their ideas, or any other advice, the A.D.M.S. will probably discuss it briefly with the Divisional Commander and in more detail with the "G.I." or "A.Q.", whilst the D.A.D.M.S. clears up minor points with the second grade Staff officers.

The A.D.M.S. and the Field Ambulance Commanding Officers discuss their plans with everyone who could possibly be affected and attend Orders Groups ("O" Groups) and discussions at Divisional and Brigade Headquarters. The extent to which various aspects of the medical plan can best be worked out at Brigade level by the Os.C. Fd. Ambs. or at Divisional level by the A.D.M.S. will vary with the type of operation. For example for a river crossing it gave excellent results if the Field Ambulance C.O. of each Assault Brigade planned the crossing of detachments of his Company in support of Brigades, and did the bidding for their priorities in craft, whilst the A.D.M.S. dealt with the crossing of the A.D.S., the follow-up Brigade's Field Ambulance, and the amphibians.

Sites for A.D.S. and C.C.P.s will be selected, and general areas for the further medical establishments to open as the advance continues will be chosen from the map. All possible routes and methods of evacuation will be studied on maps and air photographs, and discussed with all concerned; alternative plans should be made and discussed and even put on paper to insure against any failure or necessary alteration of the original plan which may be forced upon us by the enemy's reaction, by shelling, cratering, deterioration from heavy use, or flooding, etc., of the routes originally chosen.

When the plan is reasonably "firm" practices by day and by night may be carried out on ground similar to that on which the battle is to be fought.

During the Planning Phase the day on which the battle is to begin may be known to a few, but to the many it is known as "D" Day; and the time at which it will start as "H" Hour, which is the time at which the assaulting Infantry cross the Start Line, or in the case of a River Crossing the time at which the first wave of assault craft enters the water, and in Combined Operations the time at which the first craft touches down on the hostile shore. The day before the battle is to begin is thus referred to in planning as "D minus one Day," and the day after the first day of the battle as "D plus

one Day," and so on. Times before and after "H" Hour are similarly referred to as "H" plus or minus so many minutes.

For a major battle Operation Orders or Instructions and Administrative Instructions are written by Divisional and Brigade Headquarters, and the A.D.M.S. will write Medical Operation Instructions based upon these. In other cases orders may be given verbally and everyone be fully briefed at O Groups.

The Planning phase is naturally a wearing and an anxious time as one revolves in one's mind all the things which could possibly go wrong, and thinks of people whom it might be wise to brief about certain eventualities. Whatever the boom of the opening barrage may portend for the troops in the forming up areas—and for them too it commonly brings relief from tension—for Commanding Officers and for members of Headquarters' staffs it brings a happy release from planning worries and a chance to join the men of action. Whatever little detail might help to ensure success, whatever alternative in the event of failure might be worth elaborating and explaining to all concerned, it is now too late—the die is cast, so one can be off to see how it is all working out, and to give a hand where one can.

On "D" Day the first thing is of course an Artillery Barrage, and perhaps air attack on chosen targets. These may at first be merged into the normal artillery fire and air activity which have been going on for days, in order to avoid betraying our intentions. Sometimes indeed the whole barrage may be planned with deliberately deceptive intent, as in Operation "Veritable" the battle which was to destroy the enemy between the Maas and the Rhine, breaking through the Siegfried Line and the Hochwald defences East of the Reichswald. Before 5 a.m. on February 8, 1945 ("D" Day for this operation), there was no firing other than the normal artillery activity of the two Canadian Divisions which had been holding the sector before the arrival in the area of the British 30 Corps which was to carry out the assault. This had concentrated with every device to ensure secrecy—vehicle markings being obliterated, movement carried out entirely by night, and daylight reconnaissances almost entirely forbidden. Destructive fire on enemy defences from 5 to 7.30 a.m. was followed from 7.30 to 7.40 a.m. by smoke screens to make the enemy think that the attack was about to begin. He then opened up, revealing his gun positions, and from 7.40 to 7.50 a.m. there was no firing on our side whilst sound ranging and flash spotting enabled us to locate these positions.

Then from 7.50 to 9.15 a.m. there was a further period of destructive fire followed by a second smoke screen on the north-west edge of the Reichswald, thus repeating the deceptive process. Then from 9.20 a.m. there was further intensive counter-battery firing to disable enemy artillery whose positions had been located, and the opening line of the barrage consisting of mixed high explosive and smoke.

At 10 a.m. the complete barrage started, and at the gentlemanly hour of

10.30 it was "H" Hour and the first lift of the barrage occurred. The barrage moved forward in blocks of three hundred yards every twelve minutes, and at the end of each period one gun per troop fired a round of yellow smoke to indicate that the barrage was lifting and so to enable the attacking Infantry to keep close up behind it: In addition to all this artillery fire each Division organized "pepper-pot" groups, which comprised the machine-gun Battalion and available Divisional reserves of light anti-aircraft and anti-tank artillery, in order to saturate with fire the enemy defences on the immediate front and flanks of each Divisional attack.

These pepper-pots which are an occasional accompaniment to a barrage are light-weight bombardments by weapons which do not normally take part in the Divisional fire plan, such as Light anti-aircraft and anti-tank guns, mortars, and in the last war the machine-guns of the Divisional Machine-gun Battalion.

It is useful for Field Ambulance men whose duty takes them into the forward areas to know something of these matters, so that they may know which noise is "friendly," for the din of a barrage can be quite daunting.

Probably before the barrage starts troops will have been moving forward from concentration areas to assembly or forming up areas near the start line, accompanied by their regimental medical establishments. Field Ambulances will have opened C.C.P.s in pre-selected sites as far forward as possible to be ready for the first casualties, and the Divisional A.D.S. is open. These posts must be open in good time for they must not be moving about when troops are moving forward and deploying for battle, nor must they be caught on the move by any enemy counter barrage. Routes to and from all medical posts have been reconnoitred and signed where possible, or studied on the map, and all drivers have been carefully briefed. Drivers may be given typewritten slips describing the routes and the important medical posts with exact distances between each, and it is sometimes useful to draw a sketch plan of the routes in chinagraph pencil on their windscreens.

The lines on which the battle may develop will have been discussed by Field Ambulance C.O.s and their Company Commanders and M.O.s in charge of C.C.P.s at conferences with the Staffs of Brigades and with the A.D.M.S., and possible sites for C.C.P.s to open as the attack develops will have been chosen from the map. The A.D.M.S. will have planned the progressive advance of A.D.S.s to open in support of the advancing C.C.P.s and will have detailed the Field Ambulances which are to open them. During the battle O.C. Field Ambulance must keep in close touch with Brigade Headquarters, and in my opinion should live there, even if his unit Headquarters is open as the Divisional A.D.S. If an extra doctor is needed at the A.D.S. better results will be achieved if the A.D.M.S. finds one from another Field Ambulance or from the "spare M.O.'s" referred to earlier in this Section, than if the Field Ambulance C.O. puts aside his map and compass to take up the scalpel. The Field Ambulance Company Commander is more likely to have to double the

roles of doctor and medical tactician during battle. Inevitably he has an intimate liaison with Brigade Headquarters and when things are quiet at the C.C.P. he will often drop in there to keep himself "in the picture," and this is easy because his C.C.P. will usually be near Brigade H.Q.; but when the C.C.P. is busy he should be there helping in the treatment of the casualties and preventing the C.C.P. from getting swamped. Both he and the C.O., particularly the latter, will also be much on the roads visiting R.A.P.s and smoothing out muddles. R.A.P.s must be very frequently visited by officers of the Field Ambulance, for when the R.M.O. becomes suddenly overwhelmed by casualties or by some other disaster he has no time to send messages. The O.C. Fd. Amb. and his Company Commander choose the exact sites for the advancing C.C.P.s and they must inform the A.D.M.S. at once where they are located. If they do not do so they cannot complain if the Divisional A.D.S. does not move forward in such a way as to take the load off their overworked ambulance cars.

In addition to messages sent by R/T and by D.R.s it is a most useful practice for Os.C. Fd. Ambs. to send regular brief Situation Reports to the A.D.M.S. These can be cast in a somewhat demi-official form, and as well as statements of fact can include forecasts and speculations, where these may be helpful for planning future moves. I used to make several copies of these so that copies could be dropped at C.C.P.s and the A.D.S. by the messenger. These copies kept my own officers informed and were used by them in keeping all ranks "in the picture." If necessary they were divided into two parts, one of which was suitable for publication to all ranks in the form of daily News Bulletins. All ranks including officers must be trained and constantly practised in message writing for it is almost incredible what bad and misleading messages can be written even by medical officers if they are not trained in this. The verbal passing of messages incidentally affords light relief during training, and of examples of the distortion of such messages none is so perennially green as the old example in which "We are going to a Dance. Can you lend reinforcements?" was received as "We are going to a Dance. Can you lend us three and fourpence?"

Returning ambulances should be used when possible to take messages in order to save wear and tear on motor cycles and their riders. I had an invaluable rule which saved many hours of delay and much work of dispatch riders. No Field Ambulance vehicle passed the C.O.'s car or the A.D.M.S. on the road without slowing down and drawing into the side and looking to see if the officer wanted to use it to take a message. If one had forgotten something when leaving one's H.Q. it would have wasted literally hours to turn round on congested roads and go back, if indeed it were possible to do so. Nothing was more maddening than to see a vehicle of one's unit sail past and to be unable to use it to take the message. This rule is therefore warmly commended to C.O.s.

The Wireless Communications available to the Divisional Medical Services

are usually as follows. The A.D.M.S. has a 19 set by which he can communicate with the 22 sets or the three Field Ambulances on his divisional medical net. He should also have a 19 set for communication with Corps Headquarters. At Brigade Headquarters is a 19 set by which the D.A.A. and Q.M.G. can speak to the Field Ambulance on a flick frequency. An hourly flick by each Field Ambulance to its Brigade H.Q. can thus be arranged, whilst if the C.O. is at Brigade H.Q. he can speak to his unit H.Q. at any time. He could send a message to his A.D.M.S. by using certain other sets at Brigade H.Q., but the best way would be to speak to his own unit which would then relay the message on the divisional medical net to the A.D.M.S. The other two Field Ambulances would thus hear the message if a listening watch was being maintained.

Enough has been said to give a good idea of a battle, and it is unnecessary to speculate further on possible developments. The points peculiar to special types of operation should be reserved for talks dealing with the medical arrangements for such battles.

Officers, N.C.O.s, dispatch riders, ambulance drivers and orderlies who move about a battlefield equipped with much of the knowledge contained in this Section on General Military Knowledge, who have cultivated the habit of accurate observation and are schooled in noting their milometer readings, and who are regularly briefed and kept "in the picture," will not lose themselves or their patients, and will bring back for their C.O. much useful information about the battle.

[As submitted this part of Colonel Richardson's paper was followed by a series of diagrams and notes for lectures on this subject. Interesting and valuable as they indeed are the Editor regrets that financial considerations have led to their exclusion from the articles as published. We express our regret both to the author and to our readers for this compulsion.]

(To be continued)

SOME ASPECTS OF POST-WAR ARMY PSYCHIATRY

BY

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My trusted adviser, who is wise in the ways of the Army and the sceptical world outside, has stated that in order to confirm my comparatively recent status of specialist it would be advisable to write a paper on some aspects of my subject for publication. Brushing aside all my objections, he explained that in my "line of country" there were innumerable opportunities for pretty exercises of the intellect. The paper itself did not have to be drearily profound or painstakingly detailed. Provided it were written with sincerity, looked workmanlike and sounded thoughtfully provocative, it would attract no unhealthy interest and would always merit a line in the Medical Directory. He also added that no self-respecting disciple of orthodox medicine ever gave more than a fleeting and amused glance at the eccentric workings of a psychiatrist's mind.

Having therefore been persuaded, it only remained for me to find a suitable theme. At that point all the difficulties arose. The physicians, surgeons, hygienists and medical administrators have respectively their antibiotics, abdominal fretwork, fly-proof latrines and past campaigns. But psychiatrists, particularly in the Services, have very little tangible to show for their efforts. They juggle with abstractions which can neither be weighed, measured, stained nor cultured. Because analysts tackling the same psychological problem are generally like explorers trying to penetrate a dense forest from different points on its periphery, their signposts, their methods of approach and their scales of progress values may have hardly a thing in common. Official records demand labels, and so a syndrome of mental disorder, both protean and complex in character, must be given a diagnosis which most nearly conforms to that group of symptoms presenting at the stage of the natural history of the disease when it is investigated by a hurried and over-worked Area Psychiatrist. Modern psychiatry is dynamic, and the aspiring specialist has to guide him a few basic principles, an individual flair for the intricacies of human relationships and a distrust of all trite empiricisms.

It seemed at that time that a theme which would at once be interesting, instructive and topical could be elaborated under the title "Psychology and the Military Virtues." Assuming that the phrase "military virtues" implied the ability to win battles, it was necessary to determine the qualities inherent in the make-up of a good and successful soldier. The answer to the problem was possibly to be found in the biographies, autobiographies and diaries of the

most significantly victorious generals of the remote and recent past. In the records of these warriors, both conventional and unorthodox, there was plenty of material for research in the frank self-revelations, the elaborately veiled excuses, the aggressive dogmatisms and the straightforward unvarnished histories of hardly-won experience. Because generals do not win battles alone, it was imperative to know something of all the cogs in an intricate military machine.

Here again there was an abundance of books, letters and poems, passionate vignettes of private wars, and moments isolated in trenches, deserts and jungles. Discounting the modesty, the naïve pomposity, the over-dramatization and the sentiment, the bare bones of the soldierly ideal began to take shape. It was nothing new nor unexpected to find that certain qualities were constant, the military virtues embracing courage, initiative, intelligence, a quick fancy and determination. Fundamentally there was always present to a marked degree the triad of a high personal morale, a rational and far-sighted courage and an ability to improvise or "make-do." For the rest, the other ingredients were blended according to the status in the military hierarchy. To find out what where the necessary qualifications for any given rank you placed the standard pattern of a good soldier in front of the appropriate distorting mirror and saw the individual components distended, attenuated or reduced to insignificance as the position of responsibility demanded. But it must not be thought that lance-corporals and field marshals gave for their respective ranks identically similar quality profiles. With the increase in seniority there was a corresponding increase in the allowance for an idiosyncrasy. A private in a closely integrated organization like the Army cannot afford to be an individualist, but a general has to be in order to exist. The authenticated eccentricities of military genius make fascinating reading and raise an interesting point as to whether great leaders become so because of their biases, mannerisms or peculiarities, or develop them in order to emphasize the isolation of command and cloak its vulnerability. Most of these quirks and foibles were harmless and socially acceptable, but from the slightly jaundiced viewpoint of an Army psychiatrist it is an interesting commentary on the modern trend towards universal standardization that many of these great captains, now legendary and dead, would have, by reason of their obvious instability and unequally balanced characters, failed to clear the first obstacle on the road to a present-day O.C.T.U.

Only a very few of the best soldiers ever become generals, and even fewer of the generals remain consistently good soldiers. However, officers of this rank as objects of field study in the military virtues are not generally within the scope of a back-area psychiatrist. Apart from these considerations the suspicion was steadily growing in my own mind that I was trying to concoct some unnecessarily complicated technical formula for a group of qualities which any good and experienced Regular serjeant would have recognized instinctively and dismissed succinctly as "discipline" or "guts."

In the interval between wars, the good soldier with his extremely specialized capabilities tends to become something of a social anachronism. Subjected to economic disadvantages, fulfilling less than his true function, in part a drab and utilitarian symbol of past pageantry and ceremonial, and always a reminder of past and present threats to the security of the individual, the family and the group, the soldier tends to feel himself relegated to the background of national esteem. The advent of the atomic age and the growing importance of the military technician will obviously affect our present concepts of the minimum required of a soldier, so perhaps it would be more to the practical point to consider some of the principal psychiatric aspects of the Army today.

The Army is, apart from a small cadre of professional soldiers, largely composed of young National Service men, a highly selected class drawn from the same age groups and influenced in the most formative periods of their lives by roughly similar environmental factors. There is now no war, but always the ever-present shadow of one. The Army is concerned with its programme of essential training at home, and its policing and protective commitments abroad, where life may vary for the individual from monastic seclusion to near-sybaritic comfort. Basically, it seems to me, the teen-age conscript exhibits an ambivalent attitude towards his Service. Conscription is only a comparatively recent innovation in British history, and is still regarded in peacetime as an intrusion on the private life of the average citizen, who stolidly maintains that he knows his duty when he sees it. In any case, the young soldier of today generally considers it no distasteful ordeal to serve his country, even though it may be in a pedestrian and purely temporary capacity. But having decided to "muck in," he finds himself faced with a strong element of rejection. He is too young to be a veteran, and too near the veterans in age not to feel resentment at his non-participation in the exclusive camaraderie of old campaigners. At first he tends to welcome the approach of his Army life, because the status of a soldier symbolizes the attainment of manhood with the ability to shoulder its responsibilities. For the first time he may have moved outside the inhibiting influences of his immediate family circle, and there is the promise of freedom and essays into a world of fresh experience. But soon he is confronted with a new set of prohibitions comprising the minor but necessary restrictions of Service discipline, and all his old, hidden, but deep-rooted resentment against the parental authority becomes displaced on to the Army, which as a father-substitute is much more implacable, impersonal and demanding. It is against this background of uneasy loyalties that the Army psychiatrist sees the bulk of his problems, and elicits the significant and revealing case histories of the unstable dullard, the neurotic and the psychopath.

If personnel selection and available man-power were contented bed-fellows, the Army dullard would eventually vanish, and the minimum standard of intelligence for recruits would then be adequate for most of the skilled

technical employments. But various considerations, political, economical and sociological, necessitate the retention in the Army of this intellectual flotsam of the civilian population. The stable dullard, clean, cheerful, well-behaved and amenable to discipline, can be, and is, gainfully employed in some familiar, repetitive and routine job where the responsibility is slight and the demands on initiative few. But when emotional instability masks and complicates the essential subnormality the inability to adjust to Service conditions is emphasized, and there is a rapid development of the more florid psychological disturbances.

In the Army the dullard, however well intentioned, is fundamentally at a disadvantage. His equipment and personal belongings are at the mercy of the barrack-room scavenger. Blundering from one difficulty to another, he becomes the butt of his small group, and ready material for the witticisms, occasionally cruel and often unnecessary, of N.C.O.s, who are frequently too young and inexperienced in their handling of men. Suggestible and eager to be accepted, he becomes the tool and victim of his less scrupulous mates, and if things do go wrong he is quickly involved in a vicious circle of crime and punishment. Resentful, bewildered, and a self-conscious misfit, it is not surprising that he either goes absent, rebels against authority or finds a vicarious solace in chronic invalidism. This is the type of soldier who forms an appreciable percentage of the Army population in civil and military prisons, and the problems to which he gives rise, administrative, disciplinary, financial and medical, will only finally be solved by the total exclusion of all dullards from the fighting Services.

A quick survey of the cases referred for psychiatric opinion over the past year reveal the inevitable high percentage of psychoneuroses. These vary at one end of the scale from the simple anxiety states and conversion hysterias, where the clinical ground is solid and the main tracks direct and well marked, to the near-, abortive-, and pseudo-psychoses, where the confused and indistinct pathways to the hinterland of the mind wander over a morass of symptomatology. In the first group the rationale and mechanism of production are clear cut, capable of easy interpretation and possessing a good therapeutic prognosis. In the last there is an intricate, multi-layered structure of neurosis in which Army service is only a minor contributory factor, and the short-term prognosis from the military viewpoint is correspondingly poor. It is axiomatic that no psychiatric symptom can be produced in isolation as a sudden and unexpected personality variant, but must have a strong and definite relationship to the life pattern of the individual. This is a pertinent consideration when discussing the functional disorders of the post-war conscript.

There is a popular belief that the generation of infants and young school-children in the first World War developed some peculiarity in its emotional make-up. It was said to be of more delicate fibre and more temperamental than its predecessors. As proof of this were instanced the alarming increase in youthful delinquency, the extraordinary fashions in adolescent clothes, games

and fancies, and the frenetic escapist activities of the late twenties and early thirties with their mass outbursts of juvenile stupidity. This is the generation which contributed largely to our expeditionary forces in the early critical years of World War II. What real significance the environmental factors of the period 1914-1918 may have had in the overall picture of psychiatric breakdown in 1939-1945 is still to be assessed.

These two periods are not strictly comparable. During the recent war Britain was an armed camp where the disturbing influences of alien cultures and national characteristics rippled out to the most secluded of country hamlets. The war could come suddenly and in its crudest form to anybody's doorstep, and almost every family was involved by intimate ties of blood in the battles on the land and sea and in the air. A family could be bombed, uprooted, evacuated, transplanted and dispersed in the space of a few days. The lives of young children and adolescents were regulated not by the familiar school bells and factory hooters but by air-raid sirens, which could change night into day and make of every new dawn a question mark. Young people, often unprepared and ill-equipped, were asked to assume adult responsibilities. The total impact of all these factors on a character, as yet immature and developing in an atmosphere of insecurity, would obviously tend to crystallize any latent instability. The seeds of a future neurosis were well sown, and it only required the additional factors of a renewed family separation, loneliness, frustration and maladaptation to bring it to full bloom. In a detailed life history of any psychoneurotic conscript some or all of these environmental factors are to be found. The diagnosis of these conditions is generally easy, the psychopathology is not often obscure, but when it comes to the question of treatment and disposal the Army Psychiatrist is prone to subject himself to many troubled heart-searchings.

Looking at any case from a military aspect he is forced to realize that the Army with the short time at its disposal for training and its limited facilities for individual instruction cannot afford to carry unreliable and uneconomical passengers. With the possibility of slow long-term treatment, the lack of hospital beds and skilled psychotherapists, and the knowledge that many of these patients can be quickly restored to a high degree of social usefulness by the simple expedient of returning them to civilian life, the psychiatrist is constantly tempted to cut the Army's losses by recommending many of these young moderate and severe psychoneurotics for invaliding out of the Service. The tendency is, and I think quite correctly, to devote more time and attention and the resources of rehabilitation to those Regular and older soldiers who, after a period of useful service, have temporarily broken down. Their experience is valuable, and their retention if their prognoses are reasonably good is always desirable. It is probably this pragmatic approach to the problem of disposal which has given a handle to the vociferous but mainly uninformed critics of Army psychiatry, who maintain that it functions chiefly for the purpose of removing any non-co-operative soldier easily and expeditiously from

the Army. It is nearly always these very same critics who, when faced with a problem soldier in their own commands, clamour for permission to use the psychiatric "backdoor out of the Army" in order to dispose conveniently of the evidence of their own failures in man-mastership and unit administration.

The word *psychopath* like the majority of the personalities it is intended to identify is a smooth, beguiling sort of word which trips much too easily and glibly off the tongue of the apprentice-psychiatrist. The true psychopath with his outstanding deformity of character, his overwhelming egoism and his psychological stunting is not a common occurrence, but in the Army he creates an administrative furore out of all proportion to his numerical representation. The inadequate and the creative types do not present any major difficulties in disposal. They may not make good soldiers, but as civilians they must compromise with life or go under. If they do decide to tackle the conflicting currents of reality they generally bob along, partially submerged, in the stream of existence, or drift into some quiet backwater of human society where, as fanatics, eccentrics, "anti-" bodies, in the comforting isolation of their own kind, they make a patchy adaptation to the business of living. The aggressive psychopath, however, even though his anti-social traits may be dominant, can always find employment in the Army in times of war. His short-lived intense enthusiasms, his unconsidered, hair-trigger reactions, and his innate capacity for taking and holding the centre of the stage, are liable under favourable conditions to make him into a hero. With, as in many cases, a combat temperament of a high order, he can measure up to most of the fighting qualities of a good soldier. Provided his sphere of action and initiative is not too restricted and he is responsible only to himself or a small group of kindred spirits, he can make an admirable member of a private army or special force, where his nihilistic tendencies can be diverted into militarily praiseworthy channels. But as a soldier in peacetime he is in all except a small minority of cases an embarrassing misfit. With his self-seeking perspicacity he sees the Army as an irritating confusion of "usual channels" where promotion and recognition are slow and where the rewards of high virtue are discouragingly meagre. To him there is an incomprehensible unfriendly attitude towards independence.

This is his distorted perspective of the total situation, and the more astute psychopath is eager for the pickings of a post-war civilian world. In the atmosphere of shady business, questionable politics and the organized exploitation of human frailties he is much more likely to find his own niche. It is not entirely his fault for, if one examines the life-histories of those military psychopaths brought to court-martial and detained in penal institutions, it is observed that the influence of early environment nearly always outweighs that of heredity. These are the men who were for the most part conceived and reared in an earlier era of post-war depression, suffered in nearly every case from some degree of parental rejection, experienced the weakening of family ties and lowered private and public standards, and grew to physical maturity

in a jungle-like atmosphere of appeasement and unbridled aggression. If they became predatory lone wolves or combined in gangs to defy and dominate society, in emulation of their betters, then some of the responsibility must lie with that society which was so complacently blind to its own defections.

Unfortunately the psychopath is ubiquitous. He comes from all conditions and classes, and graduates from the approved schools, the great colleges, the factories and the universities. He infiltrates into business, diplomacy and all the professions. He is equally conspicuous in the barrack-room and the officers' mess. It is in this very width and depth of his distribution that the danger lies. The higher his intelligence, the better his background, the more polished his veneer, the more readily is society prepared to tolerate him and suffer his depredations. For this reason society has to be protected. The disposal of the aggressive anti-social psychopath is not really settled by his ignominious discharge from the Army to civil life, because no honest sociologist can ever dissociate himself from the larger issues involved. The criminal psychopath is said never to benefit from experience or precept; therefore one cannot appeal to a morality which is manifestly impaired or hope for a spontaneous change of heart. He may be swayed only by the fear of immediate corporal punishment or the threat of rigid segregation. In the present state of affairs these are unsatisfactory alternatives, but what the future holds in the fields of psycho-surgery, neuro-physiological research, the more drastic methods of re-orientation or even life-long supervision is still very much a matter of speculation and argument.

One of the most disturbing though interesting trends in post-war military medicine is the high and increasing incidence of psychiatric breakdown in re-enlisted Regular soldiers. Apart from the ex-prisoners-of-war and those men who have not revealed evidence of previous emotional instability, their stories all follow a familiar pattern. During the war the majority have served, often with distinction, abroad, have been demobilized with their respective groups and have left the Army with good testimonials and clean bills of health. But soon they have found that for them the tempo of civilian life has changed. Added domestic responsibilities, difficulties in accommodation, poor jobs with poorer prospects, and a diminished resilience to the hurly-burly of living cause them to look back. They invest their past Service careers with an over-coloured and nostalgic aura of friendship and security. And so, for various reasons, back to the Army they come, refugees from a world in economic flux. But between the Armies of 1945 and 1949 there is infinitely more than just a few years of difference. Units have split up and disappeared. Loyalties are vague and amorphous and in very few ways strictly defined. There is no guarantee that a man will see his family settled in married quarters, and even if there were, the prospect of early separation is never far away. The changes have been so marked, and the Regular soldier is so thin on the ground, that the re-enlisted men often find themselves in an unexpectedly difficult situation. In these circumstances, the man who has not succeeded as a civilian and is

deteriorating as a soldier will either develop a neurosis or begin to rebel against authority. Here the psychiatrist has to use all the practical means at his disposal. If the soldier is going to remain in the Army he must be rehabilitated, carefully allocated, and his abilities, such as they are, fully utilized and exploited. If his confidence is to be restored, then the welfare of his family must be reasonably assured, and there should be for him the possibility of a financially satisfactory future. When there is no alternative but discharge to civilian life use ought to be made of Industrial Rehabilitational Units and the wide and generous resources of the National Association of Mental Health. A man who has genuinely served his country well in times of need deserves all the help and consideration that that country can give him, not because it conforms to the conception of a prodigal Welfare State but because it is the common-sense approach to the safe-guarding of the national heritage.

Officers, like any other small section of the community, have their general and specific psychological occupational hazards. Within a few years of the ending of any war the status of the serving officer undergoes a subtle decline. A large proportion of a war-weary and disillusioned democracy tends to regard the Regular officer as a symbol of reaction, of unmerited and casual authority, an expensive gewgaw in the social structure, unwilling to relinquish the privileges of rank and unable to cope with the competition of civilian life. This faint but definite hostility is directly the least of the stresses to which the post-war officer is exposed but, to my mind, is indirectly responsible for many of his psychoneurotic manifestations.

The Emergency Commissioned Officer is relatively unaffected, but the officer with a Short Service Commission who has no specialist qualifications realizes, if he faces up to the situation, that he is at a critical point in his career. His future in the Army is uncertain, and his prospects circumscribed. The longer he delays his return to civilian life the more handicapped is he likely to be in the struggle for economic security. It is this long, difficult and reluctant reverse metamorphosis from military butterfly to civilian workaday grub that gives rise in less well-integrated personalities to anxiety and chronic indecision. In this post-war period it is the Regular officer who is generally faced with the more serious conflict. Accelerated wartime promotion has been more than offset by drastic cuts in expenditure involving reductions in establishments and reversion to substantive ranks. His inclinations and loyalties are bound up with his Service career for which he has spent a considerable time fitting himself, and unless he is compelled by economic necessity he has no wish to take up any other occupation. He also suspects that no civilian organization is going to rate him as high as his own Army evaluation. The young or middle-aged officer with private means is becoming uncommon, and if such a one suffers a psychoneurotic breakdown it is almost always due to some intensive reactive disturbance in his emotional life, a sexual anomaly or a constitutional personality defect. When there are dependants and his pay the only source of income he usually finds that it is barely sufficient to meet his essential

needs. As he manœuvres to adjust his mode of existence to the rising cost of living and sees his margin of financial security progressively diminishing, it is natural that he should begin to doubt his wisdom in the choice of a career and lose confidence in his ability to provide adequately for his family. It is in the spiritual wastelands that border his fortieth year of age when a man pauses to take stock of the past and the future that these factors of questioning introspection seem to operate most strongly. It is roughly in this same age-group that one has found in married officers an increasing number of anxiety-depressions and psychosomatic disorders. The officers who are most affected are those who are punctilious in meeting their obligations, possessed of a high-minded aggressive sense of duty and are meticulously conscientious, but who outside their Army lives are intellectually and socially arid. There is much that is important to be written about the essential relationship of service security and psychiatry, particularly in the cases of those specialist officers who wittingly carry on at a great disadvantage in comparison with their civilian counterparts. Under existing conditions psychoneurosis in the Regular officer is often basically not a real psychiatric problem but an economic one, and the solution appears to lie in the appreciation of his difficulties, wise state-craft and intelligent long-term military planning.

The Army does not exist in a social vacuum. Its structure, policy and internal economy are to a large extent controlled by civilian politicians and civil servants. Its man-power today is predominantly drawn from a body of young men whose outlook is uncompromisingly civilian and who do not pretend for a moment to be anything but very temporary soldiers. In order to understand something of the underlying problems of morale in the post-war Army it is necessary to recognize a few of the more adverse trends in modern life. The author has neither the experience nor the foolhardiness to attempt any detailed psycho-social survey, but in his daily travels through a great city certain superficial aspects of the atomic age seem to be distressingly obvious. The more progressive a civilization is said to be, the more does it seem to be in need of psychiatric help and guidance. Beneath the airily optimistic and academic talk of universal brotherhood, antagonisms, domestic and international, are once again hardening. There is almost a wilful and provocative misunderstanding of the other man's needs, and paranoia is the habitual indulgence of the growing army of self-considered dispossessed. It is in the ordinary things such as the behaviour of crowds during the peak period on public transport that one recognizes the vast untapped reservoirs of anti-social aggression and atavistic self-centredness, which are only just covered by the threadbare, patchwork quilt of convention.

The minor courtesies which enhance the art of living are falling more and more into abeyance. Deception and warped rationalization are increasingly becoming the accepted means of profit in commerce and, in the world of entertainment, one has only to gratify the cruder demands of the libido in order to achieve a popular if ephemeral success. This may sound pessimistic, but in any society it is always its vices which are emphasized at the expense

of its virtues, and it is certainly the vices which most influence the characters of the young men, who in their turn make the Army. With the wealth of constantly changing material at its command, the Army has great potentialities for good. It can re-educate and re-mould to its own design, and if it does nothing else but inculcate the right sort of self-discipline and the knowledge of man's essential reliance on man, it will have done a great deal towards preventing that final Armageddon, which, if it comes, can only result in the destruction of all that is best and progressive in humanity.

Army psychiatry is once again experiencing the downward swing of the pendulum. With an almost dangerous lack of suitable specialists, adequately trained staff and hospital accommodation, particularly for women, it is only a skeleton of the efficient wartime organization which fully proved its worth. But despite his limitations the military psychiatrist can be an important and valuable link in the chain of Service medicine. In this connexion the concept of bio-psychic medicine is fortunately gaining ground. Those chronic psychosomatic conditions which failed to respond to unimaginative routine treatment are now being recognized earlier, and the psychiatrist is now called in for consultation at a stage when his help can be more effective and his therapy less drastic. Finally, if the Army psychiatrist is to be of any use, he must emerge from his ivory tower of theory and adopt a positive policy of mental health. He should know a little of everything, be impartial and objective, always take the common-sense and practical approach, and above all know a good deal of the personalities of those medical colleagues with whom he is going to work. He may not achieve all these objects, but even if he partially succeeds he will have done a considerable amount in helping to raise the status of Service medicine to that high eminence in the profession which it should rightly enjoy.

Review

BRITISH RED CROSS SOCIETY FIRST AID MANUAL No. I. Ninth Edition. By Sir Harold E. Whittingham, *K.C.B.*, *K.B.E.*, *F.R.C.P.*, and Sir Stanford Cade, *K.B.E.*, *C.B.*, *F.R.C.S.*, published by Macmillan & Co., price 3s. 0d.

This compact little volume provides a comprehensive vade-mecum for the practical first-aider.

The arrangement of the subjects with which it deals in their order of importance as life-saving measures and frequency with which they are encountered makes it especially valuable as a text book for instruction from elementary stages up to the standard of the skilled first-aider. The phraseology throughout is simple, and reference to the structure and functions of the systems and organs is restricted to the essentials necessary for a proper appreciation of the reasons for the various treatment advocated.

New and practical features in this edition are the chapters on miscellaneous emergencies, action at the incident, and first-aid in Civil Defence.

E. G.

EDITORIAL NOTICES

The Editor will be glad to receive original communications upon professional subjects, travel, personal experiences, etc.

Correspondence on matters of interest to the Corps, and articles of a non-scientific character, may be accepted for publication under a *nom de plume*.

All Communications or Articles accepted and published in the "Journal of the Royal Army Medical Corps" will (unless the author notifies at the time of submission that he reserves the copyright of the article to himself) become the property of the Library and Journal Committee who will exercise full copyright powers concerning such Articles.

A free issue of twelve reprints will be made to contributors of Original Communications, and of twelve excerpts in the case of Lectures, Travels, Clinical and Other Notes. Such free reprints or excerpts will, however, owing to the shortage of paper, only be sent to those specifying their wish to have them, and a request for them should accompany the article when submitted for publication, the request being made in the form of a note at the foot of the manuscript.

Reprints or excerpts, additional to the above, can be furnished on payment if specially ordered at the time of submission of the article for publication.

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MANAGER

MAJOR H. W. PECK, *R.A.M.C.*

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Journal of the Royal Army Medical Corps.

Editorial Note

We are very happy to be able to announce the forthcoming publication of a series of authoritative articles written by Senior Officers of the United States Army Medical Corps. The scope and nature of these articles will be seen to cover a wide field and to deal mainly with organization, training and administration.

Our especial thanks are due to Major-General George E. Armstrong, Deputy Surgeon General, for the enthusiasm with which he has entered into this project. He is writing the first article himself and has infected his colleagues with no little of his own zeal.

We owe a great deal to Lieutenant-Colonel Meneces, R.A.M.C., and to Lieutenant-Colonel J. M. Matheson, R.A.M.C., Medical Liaison Officer in Washington, who took this proposal up to General Armstrong on Colonel Meneces' recent visit to Mexico and the U.S.

The importance of these articles will be realized even by looking at the authors' names and appointments and we consider ourselves fortunate to have secured such a whole-hearted and generous response to a somewhat tentative suggestion.

PROPOSED LIST OF ARTICLES ON THE UNITED STATES ARMY MEDICAL CORPS FOR THE R.A.M.C. JOURNAL

<i>Author</i>	<i>Subject</i>
I. Major-General George E. Armstrong, Deputy Surgeon General	U.S. Army and the Civilian Medical Profession
II. Colonel Paul I. Robinson, M.C., Chief, Personnel Division, Surgeon General Office	About the Personnel Division
III. Colonel Paul I. Robinson, M.C., Chief, Personnel Division, Surgeon General Office	Career Management
IV. Colonel F. L. Wergeland, M.C., Chief, Education and Training Division, U.S. Army	Education and Training in the U.S. Army Medical Department

- | | |
|---|---|
| V. Brigadier-General J. Martin, <i>M.C.</i> ,
Commanding General, Medical Field
Service School | The Medical Field Service School |
| VI. Colonel O. F. Goriup, <i>M.S.C.</i> , Chief,
Medical Service Corps, U.S. Army | The Medical Service Corps |
| VII. Colonel Walter H. Moursund, <i>M.C.</i> ,
Director, Graduate Education Army
Medical Center, Washington, D.C. | Basic Sciences in Military Medical
Graduate Training |

THE JOURNAL OF THE R.A.M.C.

A Letter from the Director-General

I AM writing to tell you of the difficult times through which the Corps Journal is passing at present, and at the same time of the steps which are being taken to overcome them. The Journal has incurred a loss of about £1,000 during the past two years and there are three main reasons for this loss.

First the increase in the cost of printing which has risen from 18s. 6d. per page in 1941 to 36s. 6d. per page today. Second, the reduction in the income from advertisements which has fallen from £1,200 per year three years ago to £600 this year. Third, the serious fall in circulation—at present fewer than 40 per cent of regular officers subscribe to the Journal, and numbers are falling each month.

The increase in the cost of printing is self-explanatory and we can do nothing about it. The loss of revenue from advertisements is due to fewer firms wishing to advertise in the Journal because of the lower circulation.

At first sight it seemed attractive to publish the Journal quarterly instead of monthly and cut down the costs of production, but looking into this further, it became clear that much of the revenue comes from advertisements, and the loss from this source with only four issues a year would be serious. It was decided instead to continue a monthly publication, and to take on a new advertising agency which has every hope of increasing the number of advertisements. At the same time it will be necessary to reduce slightly the size of the Journal, in order to cut down the costs of production until we can see ahead more clearly. Every effort will be made to ensure punctual publication each month and do away with the present time lag.

The Committee rules out the possibility of increasing the subscription thinking that, in these hard times, this might reduce the number of subscribers still further; at the same time I wish to emphasize the fact that a subscription of a pound a year for a scientific journal plus a regimental magazine is comparatively small by present standards.

An Editorial Advisory Committee has been formed consisting of the Directors of Medicine, Surgery, Army Health, Pathology and Psychiatry, the Inspector of Training and a senior T.A. officer who is a civil consultant. The functions of this committee will be to stimulate through Corps channels contributions of suitable articles for publication.

You may complain that the Journal has become dull and there is lack of articles of interest. If this is true the remedy lies in our own hands. The trouble is so many of us are too mentally lazy to commit our experiences to paper. If we had the stimulus to apply ourselves there is no lack of interesting experience and work in the Corps today which would readily fill our pages. I ask these potential writers to give their mental inertia a prod, and the Advisory Committee has been appointed with precisely this object. I am told that what the Editor would particularly like are articles of 3,000 to 5,000 words, as well as the larger ones of 5,000 to 7,000 words. The subject of these articles should be original work, clinical case reports, and personal experiences. But he puts in a special plea—please don't send articles requiring a lot of illustrations as they are very expensive to reproduce.

I appeal to every officer to support the Journal which has had such a fine scientific reputation. I know there are many calls upon your purse in these difficult days but I feel that any regular officer who does not subscribe is failing to keep himself abreast of current military medicine. The Journal has been in existence for forty-five years and it would be sad indeed to see it disappear. There is not the slightest reason that it should if the Editor and his staff, the Editorial Advisory Committee and the subscribing officers, both regular and short service, will all pull their weight in their respective spheres. Our temporary difficulties would then soon disappear.

I am sure that now you know the position I will not appeal in vain.

H. Can the

Original Communications

THORACIC AMŒBIASIS

BY

A. S. BOOKLESS, M.A., M.D.

WARTIME experience led one to respect amœbic liver infection as a potentially insidious condition especially when masquerading as acute thoracic disease.

Evidence of disease in the right chest was found in 10 out of 26 patients, suffering from hepatic amœbiasis in Middle-East hospitals, but realization of its significance was often delayed.

In spite of the many original papers on this subject, textbooks still emphasize the relatively common lung abscess and barely mention these atypical syndromes, which are consequently too often regarded as side-effects or late complications rather than predominating features.

For these reasons a detailed account of some of our patients should be profitable.

Case 1.—A private soldier, aged 20. Mauritian.

28.4.45: Admitted to hospital with fever, cough and pain in right thorax.

O.E.—Distressed. T. 102.4. P. 130. R. 42. Right lower lobe.—Diminished resonance. Tubular breath sounds. Increased vocal resonance. Some adjacent crepitant râles. Leucocyte count 15,600 per c.mm. Neutrophils 90 per cent. Three blood films—no malarial parasites.

Treatment.—Sulphapyridine. First dose of 2 grammes, thereafter 1 gramme four-hourly.

Progress.—No improvement apart from a slight fall in pulse-rate. Remittent fever rising to 103.6 on the fourth evening.

2.5.45: Leucocytes 7,800. Polymorphs 78 per cent.

3.5.45: T. 103.2. P. 110. The right base was dull and breath sounds absent—above it there were signs of lobar consolidation.

Portable X-ray Report.—(a) Considerable elevation of right diaphragmatic cupola. (b) Slight displacement of heart; bifurcation of trachea to the right. (c) Dense opacity roughly triangular in shape in right mid-zone. Upper border ill-defined but horizontal, suggesting consolidation of right middle lobe with some degree of atelectasis.

An injection of emetine hydrochloride 1 grain was given at once and repeated on the succeeding nine days. Improvement was dramatic. Temperature fell throughout the next day and was normal the day after; there was a parallel decline in pulse and respiration rates. Dullness at right base diminished, and consolidation resolved.

7.5.45: Second X-ray. Consolidation of right lung field has almost completely resolved. Right cupola is less elevated and moves feebly on respiration.

11.5.45: Sigmoidoscopy up to 10 inches. Normal mucous membrane. A little viscid mucopus in lumen. Microscopic examination of it revealed only pus cells.

14.5.45: Discharged. After two weeks he returned for a further course of emetine injections, followed by oral emetine bismuth iodide and Yatren retention enemata.

Investigations.—Stools. No vegetative entamoebæ or cysts. Sigmoidoscopy. Normal mucous membrane: only macrophages were detected in the scrapings. Final X-ray and screen examination of thorax showed clear lungs, and the diaphragm normal in height and shape with equal and full movement.

Case 2.—A private soldier, aged 33. Mauritian.

This man was admitted to hospital four times within two months. The main symptoms were fever, productive cough and pain in right shoulder.

Examination Revealed.—(a) Subacute spasmodic bronchitis which was most marked at the right base. (b) Early clubbing of fingers. (c) A moderately enlarged but insensitive spleen. No liver enlargement was detected. Leucocyte count during first admission was W.B.C. 12,400 per c.mm. (polymorphs 60 per cent, lymphocytes 38 per cent, eosinophiles 2 per cent). No abnormality was noted in two anteroposterior films of chest. Some mucus and degenerate leucocytes were noted in the stools, but no cysts or vegetative forms of *Entamoeba histolytica*. The patient recovered quickly from these four attacks but in view of recurrent fever and enlarged spleen he received a massive course of atebine before his fourth discharge. Eleven weeks later symptoms returned but on readmission to another hospital he was found to be more acutely ill. Signs of lobar pneumonia were detected at the right base.

The first anteroposterior film showed elevation of medial part of right cupola, and above it an opaque area of lung extending up to the hilum. Restricted movement was found on radioscopy.

W.B.C. 18,800 per c.mm. Polymorphs 80 per cent.

Courses of sulphapyridine, sulphathiazole, and penicillin caused no improvement. A second X-ray taken six days later showed further elevation of medial part of right cupola, obliterating the cardiophrenic angle. The lung opacity just above it had increased in size and density. Signs and symptoms quickly resolved after starting his course of injections of emetine hydrochloride. Shortly afterwards he reached hospital for the sixth time with a mild recurrence of bronchitis, but recovered in a few days. Further stool examinations were negative.

Case 3.—An officer, aged 31. Union Defence Force.

This officer previously had two short attacks of diarrhoea. (a) In 1941; (b) in January 1945. He had never suffered from dysentery.

20.5.45: Admitted to hospital complaining of (a) fever; (b) pain—right thorax; (c) pain—right shoulder aggravated by deep inspiration, he was found to have right basal bronchopneumonia. Fever declined by lysis and condition steadily improved following a course of sulphathiazole 20 grammes in all. The persistent right shoulder pain was attributed to fibrositis and was treated with physiotherapy.

3.7.45: Readmitted with recurrence of fever and of right basal bronchopneumonia, but this time the lower margin of the liver was tender and palpable.

X-ray chest: "Both lower zones show increased striation. On the right side there are some unresolved areas."

Blood.—Hb. 84 per cent; W.B.C. 9,200 per c.mm. (neutrophiles 67 per cent), lymphocytes 18 per cent, monocytes 14 per cent, eosinophiles 1 per cent).

12.7.45: A second anteroposterior film of thorax showed a crescent-shaped cap over the right diaphragmatic cupola. The lateral film of this cap showed it to be the top of a second and posterior bulge.

19.7.45: Low remittent fever persisted. Second leucocyte count: W.B.C. 10,000 per c.mm. (neutrophiles 67 per cent, lymphocytes 31 per cent, monocytes 9 per cent, eosinophiles 4 per cent). No vegetable amoebæ or cysts were found in three samples of faeces.

19-20.7.45: In the night acute pain in the right thorax and abdomen suddenly developed. After a bout of coughing, the patient expectorated about 7 ounces of blood

with pink pus, followed by plugs of blood-stained mucopus. This material contained no amœbæ. It was not offensive. The abdomen was now tender and rigid. Signs of fluid extending up to a level of 1 inch below the right clavicle were confirmed by a third film which also showed displacement of mediastinum to the left.

Daily injections of 1 grain of emetine hydrochloride were commenced at once.

20.7.45: W.B.C. 14,000 per c.mm. (polymorphs 89 per cent, lymphocytes 6 per cent, monocytes 5 per cent). The patient's distress was relieved by aspiration of 3 pints of brown turbid fluid from the right thorax. The deposit consisted of red cells and degenerate leucocytes. Fever subsided four days after the first dose of emetine, and condition rapidly improved thereafter.

26.7.45: More fluid was aspirated from the right thorax and the remainder slowly absorbed during the next five weeks.

TABLE I.—(1) FREQUENCY OF THORACIC AMŒBIASIS; (2) TYPE OF UNDERLYING HEPATIC LESION

	A	B	C
<i>Number of patients suffering from</i>	<i>Diffuse hepatitis</i>	<i>Liver abscess</i>	<i>Total</i>
I Simple hepatic amœbiasis	13	3	16
II Additional thoracic lesions	7	3	10
III Total	20	6	26

The group of patients shown in the second line of Table I includes the 3 patients described above, but excludes all those who only suffered from the minor effects of diaphragmatic irritation and pressure at the right base.

The incidence of thoracic conditions is therefore 10 out of 26 or 38 per cent, which is a relatively high proportion [1, 5, 11, 12]. The records of 3 of these 10 patients are not complete.

TABLE II.—CLINICAL FEATURES

<i>Previous History</i>							
Amœbic hepatitis	...	...	...	...	...	...	1
Clinical dysentery	...	...	...	...	...	...	1
Recurrent enteritis	...	...	...	...	...	...	3
Recurrent fever	...	...	...	...	...	...	2
Chronic bronchitis	...	...	...	...	...	...	2
Recurrent acute bronchitis	...	...	...	...	...	...	1
<i>Main Symptoms (Excluding Fever)</i>							
Cough	...	...	...	...	...	...	5
Hæmoptysis	...	...	...	...	...	...	3
Pain around right base	...	...	...	...	...	...	5
Pain. Costal margin and hypochondrium	...	...	...	...	...	...	3
Right shoulder pain	...	...	...	...	...	...	4
<i>Signs (Sometimes Absent at the Start)</i>							
Right subcostal margin tender	...	...	...	...	...	...	7
Liver edge felt	...	...	...	...	...	...	5
<i>Thoracic—Lobar consolidation</i>							
Bronchopneumonia	...	...	...	...	...	...	4
Bronchitis	...	...	...	...	...	...	3
Dry pleurisy	...	...	...	...	...	...	2
Pleural effusion	...	...	...	...	...	...	2

Previous History. (Details in Table II).—Secondary amoebiasis should be included in the differential diagnosis of recurrent fever, without localizing signs.

Onset of disease was acute in 5 and subacute in 3 patients. The initial diseases of the other 2 subsided after courses of sulphathiazole but major relapses occurred soon afterwards.

Presenting Features.—3 patients who suffered from fever and pain at the right base, and over the liver, appeared at first to have simple hepatitis. Evidence of additional chest disease was found later.

The hepatic focus was masked at first in 5 patients, whose original signs and symptoms were those of thoracic disease.

Two patients were febrile and toxæmic for some days before local signs developed in the right lung.

Earlier appreciation of the significance of shoulder pain would have hastened the diagnosis on three occasions [1, 8, 11, 13].

DEVELOPMENT OF HEPATO-PULMONARY AMOEBIASIS

The occurrence and character of these pulmonary conditions depends on the site, extent and acuity of the underlying liver infection. The usual stages of development are as follows [4]:

(1) *Restricted or Abnormal Movement of the Right Dome.*—These were the only radiological defects to be observed in 2 patients. In one of them reverse movements of the cupola on sniffing and on forced inspiration were

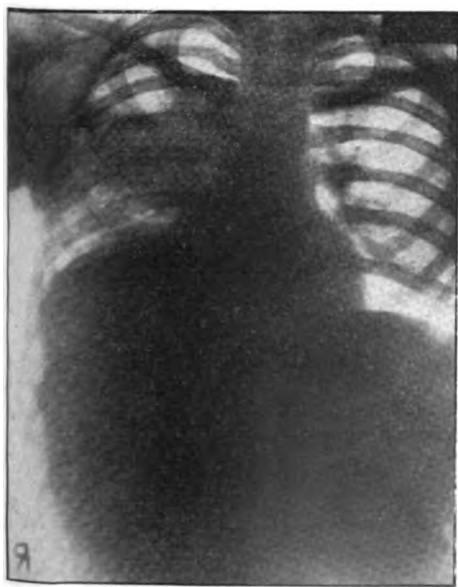


FIG. 1 (Case 1).—3.5.45: Specific treatment commenced on the same day.

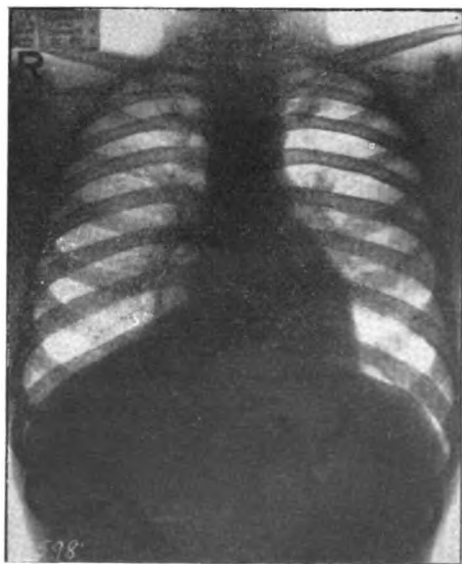


FIG. 2 (Case 2).—17.11.44.

seen in addition to the limited respiratory movement. These latter tests, described by Munk [9], were found useful but not specific.

(2) *A raised right dome* either generalized, or a local hump or a combination of both as in Case 3. Obliteration of right cardiophrenic angle, a feature emphasized by Oschner and DeBaakey [10, 11], can be seen in figs. 1 and 3.

(3) *Basal fibrinous pleurisy* causing thickened pleura, adhesions and obliteration of the costophrenic angle. Pleural pain and friction commonly occur in simple amœbic hepatitis and patients exhibiting these signs alone do not concern us. Right shoulder pain is caused by dry pleurisy over the central two-thirds of the right domes [11, 13]. Thickening of the septum between middle and lower lobes may appear later [3].

(4) *Bronchopneumonia at the Right Base*.—Air entry is diminished and breath sounds are harsh with added crackling râles on inspiration.

Opacities are based on the right dome and may obscure its outline. Their shape may be triangular with apex towards the hilum [10] or else amorphous and of unequal density. There may also be transverse or oblique linear shadows which are probably caused by atelectatic patches [9].

(5) *Amœbic Lung Abscess*.—Not one example occurred. The abscess of Patient 3 must have been subdiaphragmatic before rupturing. It is probable, therefore, that even without specific treatment the progress of hepatopulmonary amœbiasis may be arrested before an abscess forms.

OTHER THORACIC CONDITIONS DUE TO HEPATIC AMŒBIASES

(a) *Lobar pneumonia* in these patients, e.g. 1 and 2, the onset was acute although local manifestations were sometimes delayed. In the films of 2 patients the opaque areas were seen in the right mid-zone and were separated from the right cupola by an area of clear lung. Traction of mediastinum to the right, observed in fig. 1 showed that the condition was partly atelectatic.

(b) *Bronchitis*.—Both of these patients had previously suffered from bronchitis. Onset of illness was subacute. Râles although present at both bases were more marked on the right. Anteroposterior chest films were normal. Stools which were examined because of associated liver tenderness in one patient, and paradoxical diaphragmatic movements in the other, were positive on each occasion. Both patients responded quickly to treatment.

(c) *Serous Pleural Effusion*.—One hæmorrhagic effusion was encountered, but there was not one serous effusion that could reasonably be attributed to hepatic amœbiasis although such cases are frequently described [1, 2, 9, 12].

PATHOLOGY

Vegetative *Entamœba histolyticæ* were only found in the stools of 2 patients. Routine sigmoidoscopic examinations during convalescence revealed no ulcers or gross inflammation. Scrapings were only positive on one occasion.

Total leucocyte counts ranged from 23,000 to 5,000 per c.mm. The average was 14,700 per c.mm. The percentage of polymorphs varied from 90 per

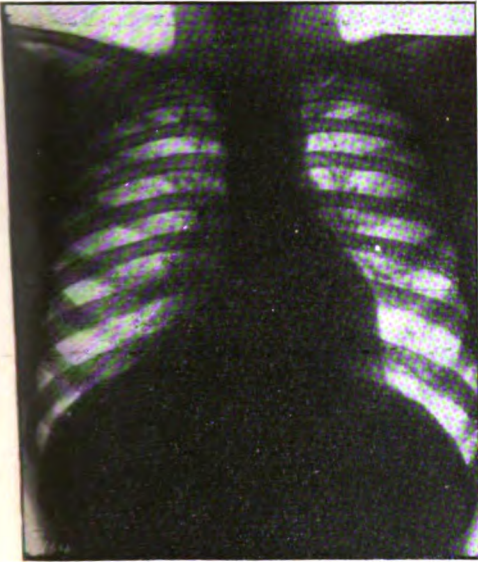


FIG. 3 (Case 2).—23.11.44 (approx.).

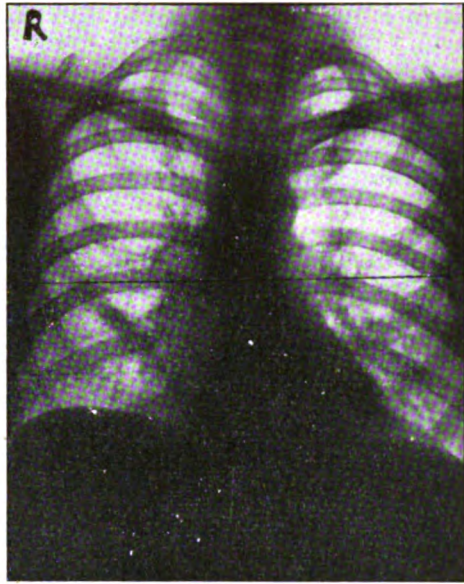


FIG. 4 (Case 3).—4.7.45.



FIG. 5 (Case 3) —14.7.45.

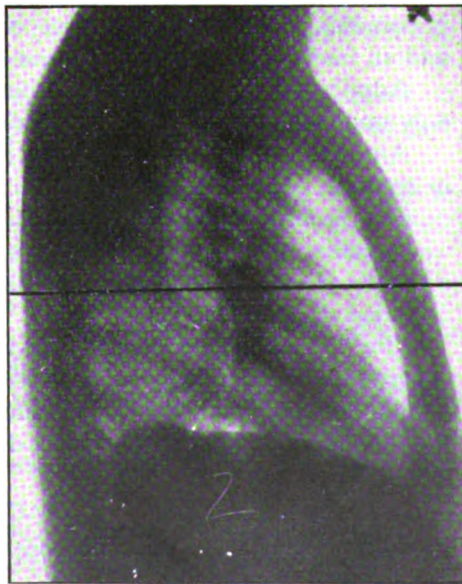


FIG. 6 (Case 3).—(Lateral) 14.7.45: The abscess ruptured six days afterwards.

cent to 50 per cent with an average of 71 per cent. These white cell counts hardly differed from those of patients who had simple amœbic hepatitis. Our record, therefore, of a slight total leucocytosis without a corresponding increase in the percentage of polymorphs is similar to the findings of others [10, 11].

As no amœbic lung abscess was encountered the nearest approximation to anchovy sauce sputum was the pink pus coughed up by Patient 3. Two others had small hæmoptyses. Sputum of the remainder was scanty, mucopurulent and not distinctive. On no occasion were any amœbæ detected.

TREATMENT

Only on four occasions was emetine the first and original treatment. Owing to mistaken diagnoses 5 patients received courses of sulphonamides at first. One of them had penicillin as well.

Most patients quickly recovered and became afebrile from two to four days after starting a course of daily 1 grain injections of emetine hydrochloride lasting ten or twelve days. Blood pressures were maintained and toxic signs were absent. Standard courses of stovarsol, emetine bismuth iodide, and Yatren enemata were given later.

The hæmorrhagic effusion of Patient 3 was tapped several times. Exploration of the liver or surgical drainage was never considered.

DIAGNOSIS

In our experience the vague group of basal pneumonias, including virus pneumonia, was the main source of confusion. Unlike others [3, 10, 11] we seldom had to consider tuberculosis as an alternative.

Admittedly the diagnosis of thoracic amœbiasis in our patients were not only unconfirmed, but sometimes rested on slender evidence.

Amœbæ were only found twice in the stools. They were never discovered in sputum, pleural fluid or expectorated abscess contents.

Conclusions therefore largely depended on the effect of emetine, which was usually rapid but not always so. The final opinions were not those of a single observer but rested on the available facts as assessed by all who attended the patient.

The correct use of emetine as a therapeutic test requires judgment and experience. The treatment of acutely ill patients cannot always depend on laboratory confirmation. Its premature use, on the other hand, led sometimes to delay in reaching a correct diagnosis.

PATHOGENESIS

There are three significant points in our experience of hepato-pulmonary amœbiasis.

(1) Diffuse hepatitis was the commoner underlying liver condition, compared with liver abscess.

(2) In spite of the high incidence of thoracic conditions, no amœbic lung abscess was found.

(3) Signs and symptoms of chest disease were often acute and preceded those of the underlying liver condition rather than following them.

Of course amœbæ must sometimes pass up the transdiaphragmatic lymphatics [4, 5, 11, 13] and penetrate pleura and lungs to set up a right basal pneumonia, followed perhaps by a lung abscess.

Consideration, however, of these three points leads me to believe that although signs of pneumonic, pleural, bronchitic or atelectatic lesions may appear first, these processes are often, nevertheless, just indirect results of subdiaphragmatic inflammation. The actual entry of amœbæ into the thorax may be delayed until a lung abscess begins to form or until a liver abscess ruptures upwards.

It is still more difficult to ascribe lesions separated from the diaphragm by a zone of clear lung, to the direct action of amœbæ.

(1) *Double Pathology*.—Some of these patches of consolidation are attributed to independent bacterial inflammation of areas of lung rendered vulnerable by pressure or other factors. This theory can hardly be reconciled with the curative effect of emetine.

(2) *Atelectasis*.—The right mid-zone opacity of Case 1 was partly atelectatic. Munk has described several cases in which "atelectatic plates" occur above the raised right dome. These he attributes to pressure.

(3) *Linear opacities*, such as that observed in figs. 4 and 5, may be either small interlobar effusions or thickened interlobar septa.

(4) *Blood-borne Emboli from Colon to Lung*.—We encountered no examples of this rare condition described by Dormer [3], Manson-Bahr [8], Oschner [10, 11], and Zaky [13].

None of these theories is comprehensive and further speculation based on limited material is unprofitable since these conditions, however produced, are cured by emetine.

A study of our patients emphasizes the old precept: that underlying amœbic infection should always be considered when a right-sided chest disease occurs in a patient who has lived in an endemic area.

SUMMARY

(a) 10 out of 26 patients with hepatic amœbiasis had lesions in the right chest. Yet not a single lung abscess was found.

(b) Amœbic hepatitis was the commoner underlying condition, compared with liver abscess.

(c) Signs and symptoms of chest disease were often acute, and preceded those of the associated liver condition.

(d) Right shoulder pain received insufficient attention.

(e) These chest lesions may not always be due to the actual entry of amœbæ into the thorax.

(f) The consideration of pulmonary amœbiasis in the differential diagnosis of right-sided chest disease is advocated.

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EPIDEMIC ORCHITIS

A Report with Biopsy Studies of an Outbreak of Twenty-one Cases Occurring in Gold Coast Negro Troops

BY

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A MINOR epidemic of an inflammatory disease affecting mainly the testicles occurred in the Accra area of the Gold Coast District at the end of 1948. The patients were all Gold Coast native troops from both Southern and Northern territories and were admitted to the 37 (Accra) W.A. Military Hospital Special Treatment Department. A total of 21 cases were seen: 1 in June, 2 in September, 1 in October, 10 in November, 6 in December and 1 in January. 3 more doubtful cases were seen and 2 more occurred in the period February–May which have not been included in the averages. Examination of the records over a three-year period from June 1946 to May 1949 reveals no comparable outbreak although there is a small number of cases recorded as having been diagnosed simply as orchitis. There are 31 cases in this period which appear from their notes to be very similar to and may be identical with the disease at present under review. 7 of these occurred in January 1947 and 5 in June of that year but in no other month were there more than 2 cases. Over the same period cases of true gonococcal epididymitis occurred at a steady rate showing no comparable variation.

It appears probable, therefore, that there is in this area an endemic testicular inflammation with a slight tendency to minor epidemic outbursts. The following description of the disease as it was seen in these 21 cases is given, together with an attempt to elucidate its ætiology.

GENERAL DESCRIPTION

The disease is very painful causing the patients to report sick very soon after the onset of symptoms (average 2.1 days). They were all admitted to hospital on the following day, the common complaint was that pain was experienced first and that subsequently the swelling was discovered. A characteristic attitude was adopted with the knee on the affected side slightly flexed with slight lateral flexion of the spine to the same side. All except three also complained of "pain in the waist" (87 per cent) but there were no physical signs of any local lesion to account for this. The affected testicle was enlarged to about three times the normal bulk and was exquisitely tender; 2 cases of extreme enlargement occurred with scrotal circumferences

of 29 and 31 cm. A small hydrocele was present in 8 cases (38 per cent) containing from 8 to 38 ml. of clear fluid. The epididymis was involved in 10 cases (47 per cent) but in all the enlargement was much less than that of the testicle and much later in onset (average seven days). The enlargement was soft and gave the impression that it was due to oedema although one case did at one stage resemble tuberculous epididymitis, subsequently to resolve completely. There was tenderness and soft swelling of the spermatic cord in 4 cases (19 per cent). Scrotal oedema was present in 5 cases from the start (23 per cent) and developed in nearly all cases at some stage. 2 of the early cases had scrotal and crural dermatitis with angular cheilitis syndrome of which there was an outbreak here in June 1948 and which is attributed to a dietetic deficiency, possibly ariboflavinosis (Mackay, 1948). These changes are entirely different from the typical lesion which is most characteristic: there is a brawny, almost shiny, oedema which broadens the folds of the scrotal skin but does not entirely obliterate the sulci. Ulceration may rarely occur superficially. In no case was acute inguinal lymph-node inflammation seen. There was a urethral discharge in 4 cases in 2 of which it was due to a concomitant attack of acute gonorrhœa.

General symptoms were slight. Fever was absent except in the 2 very severe cases and nothing like a typical temperature chart was seen. Pulse and respiration were normal and there was no abnormality of bowel movement or micturition except some minor complaints of dysuria probably due to local tenderness. No abnormal signs were found on general routine examination. Rectal examinations showed no abnormality of the prostate or vesicles. There was no enlargement of the spleen or lymph nodes or of the salivary glands.

After admission to hospital the swelling and symptoms increased for a few days and then settled slowly. It is not possible to give the exact duration as many cases were discharged as soon as progress was satisfactory, the average period of hospitalization being seventeen days. All were stationary within six weeks and most within one month so that clinically it is a self-limiting disease of probable duration of three to four weeks. Confinement to bed was necessary for a few days only. Resolution appeared to be complete in all except 3 cases although it was felt that there was some slight increase in density of the testicle and slightly diminished sensation. In 2 cases a large hard testicle remained on discharge which caused a dragging sensation although clinically all inflammation had subsided. In one other there was a residual hydrocele which was, however, getting progressively smaller. One case had a relapse on the same side and had to be readmitted in a very sick condition, one was bilateral from the start and in one extension to the other side occurred while under treatment.

CLINICAL PATHOLOGY

Urethral discharge: in 2 non-gonococcal cases there were scanty pus and epithelial cells but no micro-organisms were seen.

Prostatic massage: sufficient material for a smear was obtained in 8 cases only (26 per cent) and these showed a few pus cells as the only abnormality.

Hydrocele fluid: average protein content 4.3 grammes per cent. All specimens showed a few lymphocytes; no micro-organisms were seen and all cultures remained sterile.

Urine: In no case was urinary infection conclusively demonstrated (Handley, 1946). Pus cells were present in small numbers in one case and one had albuminuria. All cultures remained sterile.

Stools: Routine testing showed *Strongyloides stercoralis* as the only abnormality in one case only.

Hæmatological Findings.—Blood cultures from 2 patients were sterile. Hæmoglobin 13.5–14.5 grammes per cent. E.S.R. 15–48 mm. in one hour (Wintrobe), average 28 mm. Average P.C.V. was 45 per cent so that is a "marked" increase in rate of sedimentation. The average total white cell count was 7,200 per c.mm.; this is probably a little above the average for this race but is not significantly different from that of a parallel series of 19 gonococcal epididymitis cases. No abnormality seen in thin-stained films; thick smears

	<i>Orchitis</i>		<i>Gonococcal epididymitis</i>		<i>Racial normals</i>
Total W.B.C.		7,200		7,400	4,000–7,000
Polynuclears	47%	3,400	60%	4,400	40–70% 2,000–5,000
Large lymphocytes	15%	1,100	10%	700	} 20–60% 1,000–4,000
Small lymphocytes	30%	2,200	25%	1,900	
Monocytes	5%	300	2%	200	
Eosinophils	3%	200	3%	200	

showed no malarial parasites or filariæ. No microfilariae were seen in wet preparations from 2 patients in whom scrotal oedema was particularly marked.

Serological Findings.—The Kahn reaction was positive in 47 per cent of cases. Owing to the high incidence of healed yaws this is slightly below the average for normal recruits; several of the negative results were repeated and in no case was "Kahn conversion" observed. Widal reactions, Brucella agglutinations and Weil-Felix reactions were each negative in 3 cases.

Histopathology.—Biopsies were made from 2 cases, one of which had a small hydrocele. Both were severe cases and the specimen was removed from both quite late in the disease, one in the second week and in the other in the fourth week. On discharge the former had a residual painless swelling but the latter was apparently normal. The procedure is apparently harmless (Wiesner, 1947) and incision of the tunica has actually been used in the treatment of orchitis due to mumps (Wesselhoef and Vose, 1942).

The picture in the early case was that of an acute, non-suppurative inflammation affecting mainly the interstitial tissue. The visceral endothelium of the tunica vaginalis was irregularly hyperplastic with adherent small fibrin masses. The albuginea appeared normal. In the testicle itself spermatogenesis was at a standstill except possibly for one small area. Most of the tubular lumina were filled with hyperplastic germinal epithelium: there was considerable variability in cell size but no true differentiation. The interstitium was œdematous and grossly infiltrated with small round cells and showed fibroblastic activity. There was some histiocytic infiltration, a few of these cells containing ingested degenerate lymphocytes. The interstitial cells themselves were well preserved. Some Sertoli cells could be distinguished and the basement membrane and supporting tissues of the tubules were apparently healthy. Careful search revealed no inclusion bodies as found in the acinar cells of the parotid gland in experimental mumps (Johnson and Goodpasture, 1936).

The sections from the later case show mainly fibrous tissue and few tubules could be made out. There was considerable interstitial fibrinous exudate which was undergoing organization in one area. No normal functioning tubules were seen. The sections were small, however, and may have been taken entirely from just beneath the capsule.

The general picture is one of non-suppurative interstitial inflammation with secondary effects on the tubular epithelium and a tendency to fibrosis.

Specimens from both cases were cultured on a wide variety of media under varying conditions but remained sterile. No attempts at virus culture were made.

TREATMENT

General Measures.—All cases were treated with bed rest in the early stages and in the severe cases the scrotum was suspended on an "Elastoplast" sling across the thighs. In one case with an initial scrotal diameter of 31 cm. this measure alone produced a diminution in size of 2–3 cm. per day. All patients were fitted with suspensory bandages and encouraged to drink large volumes of fluid.

Drug Treatment.—Analgesic and soporific drugs were required by most patients for a few days. The other drugs used were penicillin (25,000 or 50,000 units three-hourly for five days), sulphathiazole (30 grammes in five days with potassium citrate grains 20 t.d.s.) and N.A.B. (0.15 gramme, 0.3 gramme and two doses of 0.45 gramme at three-day intervals). The series is too small for analysis of the results to be significant and no completely untreated controls are available. The impression was gained, however, that none of the drugs used has any therapeutic value in this condition. Thus, in 3 cases two drugs were administered consecutively (in one case penicillin after sulphonamide, in one sulphonamide after penicillin and in the third arsenic after sulphonamide) and in each case improvement is recorded only as following the course of the second drug; while these combinations administered concurrently have given little immediate response. Further, the duration of stay in hospital for those receiving one drug only was 11.8 days (9 cases) in the case of penicillin and 9

days (3 cases) for sulphathiazole whereas for those receiving two drugs it was 25.3 days for penicillin and sulphathiazole (3 cases) and 29 days for arsenic and sulphathiazole (3 cases). Thus it appears that the milder cases only stayed long enough to receive one drug. Finally if the 13 cases that did receive penicillin are compared with the 8 that did not it is seen that there is no significant difference (15.1 as against 16.6 days).

FOLLOW-UP

It was possible to trace only 6 cases, which were seen at periods varying from four to six months. Of the remaining 15, 10 had been discharged from the Army and were marked "A.1" in their release books and the other 5 were posted to inaccessible stations. Of the 6 seen personally, 3 had returned completely to normal, 3 had residual inguinal lymph-node enlargement that may have been completely unrelated to orchitis and in only 1 case was the testicle itself definitely abnormal. There was slight enlargement, hardness and diminution of pain sense. All 6 claimed full potency. An attempt was made to get semen specimens but in only one case was a usable specimen obtained—this was 0.5 ml. in volume and contained a few small round cells only. No spermatozoa were seen. The evaluation of this result is complex. For numerous reasons all specimens in this country are collected in the laboratory or its side-rooms and it was not felt that an exception could be made of this test (Harvey and Jackson, 1945). On the other hand suitable specimens of adequate bulk are thus obtained in about three-quarters of routine semen analysis although in these cases the patient has usually asked to be investigated. All things being considered it does seem probable that there is a reduction in testicular secretion and spermatogenesis at least for four months from the onset of the disease. No semen analyses were performed in the early stages as it was felt to be therapeutically undesirable.

DISCUSSION

I believe the above considerations to show that there is in this area a disease *sui generis* of the male reproductive apparatus forming a syndrome of sufficiently definite characteristics to justify the assumption of a single ætiology. As far as I am aware it has not been previously described.

It is apparently infective in origin although no information about site of entry or transmission was discovered. It is felt that were the infecting agent anything other than a virus it would have been found. This assumption is strengthened by the type of histological picture found and the similarity it shows to that of mumps orchitis.

That it is different from the gonococcal complications of the gonads is shown by the following considerations. There was a history of gonorrhœa in only 4 cases (19 per cent) with an average period since cure of ten months. This is certainly not above the average rate of infection in routine non-venereal case histories in this hospital and a series of 19 proven cases of gonococcal epididymitis over the same period all had a history of recent infection. The testicle

was affected first in all cases except one (5 per cent) and the epididymis was involved in less than half the cases (47 per cent). Finally the enlargement of the testicle was much greater than could be accounted for by mere inflammation of the tunica (Boyd, 1948).

The condition is probably not a venereal one. If the history of cohabitation is compared with that obtained in gonococcal epididymis, a condition occurring in a similar group of persons and no fixed time after intercourse, it is seen that they are very similar and that no true pattern can be discerned. This gives only indirect evidence and such histories are notoriously unreliable; further an excessively long incubation period comparable e.g. to that of inoculation hepatitis, would not be disclosed in such an analysis. It may be significant that two young patients strenuously denied ever having had intercourse, their ages being 17 and 18 years respectively. Two others would admit no more recent connexion than three and five months previously.

	<i>Orchitis</i> (21 cases)	<i>Gonococcal epididymitis</i> (19 cases)
<i>Last cohabitation:</i>		
Shortest interval	1 week	2 days
Longest interval	5 months	6 months
Average	4 months	4½ months
<i>Cohabited with:</i>		
Prostitute	76 per cent	78 per cent
Wife	9 per cent	16 per cent
Total	85 per cent	94 per cent
No history	15 per cent	6 per cent

There is, therefore, no evidence to suggest that it is a venereal condition and if it should be, a possibility that cannot be excluded, the incubation period must be at least one month. There was no clinical evidence of infection by any of the usual venereal routes, no case having a genital sore and only two having scanty non-specific urethral discharges.

Histologically the lesion in the earlier case is very similar to that of mumps orchitis as seen in a case dying from embolism eleven days after the testicle became involved (Gall, 1947). From operation specimens taken within the first five days, however, this author showed that although the early lesion was lymphocytic in the interstitium and capsule a polynuclear exudate collected in the tubules. Of the lesion at eleven days he comments that "It is interesting that in none of the tubules of this case were polynuclear leucocytes so prominent a feature as in the earlier and more acute lesions . . ." In the present 2 cases polynuclears were practically absent from the sections as might be expected if they do represent a later stage of the same process. Gall's case showed some tubular organization manifested by increased thickness of the lamina propria and collagenization of both the lamina and the Sertoli remnants attached to

the wall a later stage of which is seen in these cases. In the small piece removed during the fourth week commencing organization is seen and although there is no evidence that this is necessarily a diffuse change it does suggest in combination with the limited follow-up findings that atrophy may ensue. This contrasts with Gall's view that "Despite the degree of damage it would seem from the nature and extent of the changes that complete atrophy of the testis would be an unusual sequela."

The commonly reported causes of orchitis are mumps, undulant fever, typhoid fever and trauma (Mason and Reifenstein, 1944). Rarely reported causes are infectious mononucleosis (Mackay-Dick, 1944), acute rheumatism (Trasoff and Goodman, 1944), pyogenic infection (Reyes, 1944), *Klebsiella pneumoniae* infection (Serri, 1946), meningococcal and lymphocytic chorio-meningitis, Bornholm disease, atypical pneumonia and Dengue (de Langen, 1936).

The features of these cases do not suggest that any of these diseases was the cause of the orchitis seen.

Mumps in this area is not uncommon, but is as far as is known always typical; none of these patients had any salivary gland enlargement. Undulant fever is very rare and typhoid fever is uncommon—no case of either occurred at the same time nor was there any serological evidence of these infections. 2 cases only had a history of trauma and in neither case was it of such a nature as to account for the lesion seen. Falciparum malaria is very prevalent in the Gold Coast but apart from 2 cases that developed pyrexia while under treatment and had a typical attack with a positive film while in hospital routine blood films were negative in all cases. Owing to the freedom given to patients in this department and the fact that native troops do not take suppressives this is not an uncommon occurrence. No evidence of filariasis was found despite intensive search of numerous wet preparations taken six-hourly in two patients and routine thick film examination in all the others.

The cases were very similar to Mackay-Dick's first case seen in England in which there was no lymph-nodular enlargement or increase into the diagnostic range (Whitby and Britton, 1947) of mononuclear cells (large lymphocytes, 3 per cent, monocytes, 8 per cent). A diagnosis of infectious mononucleosis was made on a heterophile agglutinin titre of 1 : 512 against a control of 1 : 16 but absorption tests were not done. It is, of course, possible that this agglutination was due to another agent than that which causes glandular fever although this is unlikely. Unfortunately, this report was not seen until the epidemic died down and this reaction was not investigated; however, no abnormal cells had been seen and in no case was a mononucleosis present. His second case was quite unlike these on clinical grounds.

Apart from the marked increase in the E.S.R. there is no evidence that rheumatic fever can be implicated and the majority of patients received salicylates at some stage for the pain without any noticeable effect on the local lesion although the dosage was, of course, small. The results of the pathological

investigations dispose of the possibility of pyogenic or *Klebsiella pneumoniae* (Serri, 1946) infections.

No suspicion that any of the conditions of meningococcal meningitis, lymphocytic choriomeningitis, Bornholm disease or atypical pneumonia was the cause of the epidemic can be entertained but it is interesting to note that the last three of these conditions are due to virus infections and that lymphocytic meningitis has been found to be associated with a raised heterophile agglutinin titre (Tidy, 1947). The position with regard to dengue must, however, be carefully examined. The disease does occur in this area and *Aedes ægypti* are very numerous. Variability of the disease is stressed by the authorities and a series of 1,000 cases without a rash has been described (Jack, 1937). The uniform complaint of these soldiers of "pain in the waist" usually denoting spinal pain is suggestive. It is then possible, although unlikely, that they represent an atypical disease of this group.

The majority of descriptions of non-specific epididymo-orchitis (Report, 1943) relate to a different type of case although involvement of the testicle is a late feature. There is more similarity between these cases and those of an epidemic in Malta in summer 1943 (Tunbridge *et al.*, 1946) although there are again certain marked differences. Fever was uncommon in the Accra cases and the "testicular" rise in temperature was not seen. In both epidemics the left side was more often affected (Accra 62 per cent, Malta 69 per cent) but in Malta there appears to have been more severe involvement of the epididymis and in only 4 cases was the testicle alone involved (14 per cent). In both series one case was seen in which the physical signs of tuberculous epididymitis were present at one stage. There is no significant difference in the duration or sequelæ and the clinical pathology is markedly similar with the exception of the raised E.S.R. in the Accra cases. It is interesting that one of the Malta cases had cervical adenitis. It is possible that the quantitative differences in the frequencies of the different characters are due to variations in local conditions and in the races that are affected more than to any intrinsic difference in the infecting agent.

SUMMARY

Twenty-one cases of orchitis are described and it is suggested that they represent a small epidemic of an infection endemic in the Accra area. There is some evidence that a similar condition occurs elsewhere.

The lesion is a painful non-suppurative inflammation unaffected by the treatments tried and running a self-limiting course of three to four weeks.

It is suggested that it is due to infection by a virus.

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POLYARTERITIS NODOSA

Report of a Case

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CREDIT is usually given to Kussmaul and Maier for the description of periarteritis nodosa in 1866. The cases were originally suspected to be suffering from trichinosis. However, it is of historical interest that Rokitansky first described the macroscopical lesions in 1852 under the title "The formation of aneurysms of the arteries in general, except the aorta and most of its primary branches, with a further exception of the cerebral arteries." Thirty-five years later Eppinger reviewed the microscopical sections and confirmed the diagnosis. There is even some reason for believing that the disease was recognized as early as 1755 by Michaelis and Matani; and in 1810 Pelletan reported briefly a case in which he counted 63 small aneurysms of various arteries. Carnegie Dickson pointed out that, since the disease involves the arteries of almost any part of the body and since the pathological changes are not confined to the adventitia, a more appropriate name for the condition would be polyarteritis nodosa and that name has now been generally accepted.

Polyarteritis nodosa is still considered to be a very rare complaint although a considerable number of cases have been reported within the last ten years. The symptoms produced are diverse and it has been suggested that the condition may be a pathological entity rather than a disease *sui generis*. The order of frequency of the more significant findings is: fever, leucocytosis (10,000–54,000 per c.mm.), albuminuria, hypertension, rapid onset of symptoms, abdominal pain, œdema, loss of weight, hæmaturia and neuritis. Tonkin and Pulvertaft (1948) emphasized that palpable skin nodules and eosinophilia, usually regarded as essential diagnostic criteria of polyarteritis nodosa, are very rarely encountered, and Handley and Martin (1939) found that only some 12 per cent of the reported cases showed a marked eosinophilia and noted figures sometimes as high as 77 per cent of 20,000 cells. Much more constant features of the disease are persistent tachycardia out of proportion to the fever, cardiac arrhythmia and a changing electrocardiogram. These points are especially striking in the so-called "cardiac type" of the disease. I would like to add a rather high erythrocyte sedimentation rate, the absence of response to digitalis therapy and persistent signs of severe myocardial involvement, manifested

by pulsus alternans and gallop rhythm. Another clinically important sign may be the complete unawareness by the patient of the gravity of his condition. Where the nervous system is involved the presenting symptoms may be those of multiple interstitial neuritis with degeneration of the peripheral nerves secondary to the damage to the nutrient arteries rather than those of toxic polyneuritis. Similar lesions may occur in the brain and spinal cord and the spinal fluid may be under increased pressure. There may be xanthochromia and a polymorphonuclear leucocytosis. Bearing in mind these signs and symptoms should assist in the diagnosis of the disease during life or at least lead to its consideration in a differential diagnosis. However, a comparatively small number of cases have been diagnosed during life with the exception of the "nodular type" where the diagnosis is usually established by biopsy. The difficulties can easily be understood if one considers how widespread and profuse are the lesions found at autopsy.

The histological changes suggest a necrotizing arteritis and the location of the lesion in the vessels depends upon the size of the artery. In larger arteries changes occur at the junction of the media and adventitia, in the small vessels the lesions are subintimal. Arkin (1930) has divided the process of the disease into four stages. The first stage is dominated by necrotic changes in the inner media of the arterioles and in the outer media of the larger arteries. Oedema and fibrinous exudate are also present. In the second stage exudative inflammation is predominant and the media and the adventitia are the seat of massive accumulations of polymorphonuclear cells, eosinophilic leucocytes, lymphocytes and plasma cells. Proliferation of connective tissue occurs in the intima, and complications such as formation of aneurysms, thrombosis and hæmorrhages occur towards the end of this stage. In the third stage the regenerative and proliferative process are predominant. Organization of thrombi and formation of granulation tissue take place. The final stage is characterized by formation of scar tissue and healing. In an advanced case hardly a single organ escapes although more recently it has been stated that in a significant number of cases the pathological changes can be demonstrated only after careful microscopical examination of every organ and that the disease may be localized to one organ only.

Contrary to the belief that polyarteritis nodosa carries a 100 per cent mortality "healed cases of polyarteritis nodosa" have recently been reported, and Tonkin and Pulvertaft (1948) in their report of a case state that over half the patients recover and this recovery may even include complete resolution of the pathological lesions in the arteries. Although this figure of 50 per cent recovery strikes one as rather high it may include cases where the disease runs an intermittent course for many years.

Consideration of the fact that the lesions of polyarteritis nodosa can be localized leads to speculation as to whether temporal arteritis can be considered a variant of the same disease. It is true that temporal arteritis is more often found in older people but the reported range of age in cases of polyarteritis nodosa is extending from 3 months to 78 years (Keith and Baggenstoss, 1941).

Acute temporal arteritis has been mentioned in the literature since 1931. There is considerable similarity between the cases. Some patients often present the appearance of being severely ill entirely out of proportion to the amount of local disease present. Hoyt, Perera and Kauvar (1941) believe that temporal arteritis is but a local manifestation of a more widespread disease. The fact that the pathological specimens demonstrate very similar histological changes to the findings in polyarteritis nodosa leads one to suspect that it is a localized form of the latter disorder. Gordon and Thurber (1946) reported a case of temporal arteritis occurring in a 65-year-old man who complained of severe headache, pain over both temporal regions and severe pain in both thighs. Biopsy of the tender pulsating arteries revealed active arteritis. The authors feel that the pain in the thighs was part of the clinical picture and that temporal arteritis is really only a part of widespread polyarteritis. Furthermore, if one compares the findings in temporal arteritis with reports of necropsy examinations in polyarteritis nodosa one feels inclined to subscribe to this view as many arteries exhibit the same pathological changes as do the temporal arteries and the histological pictures are similar in both diseases.

Theories as to causation of polyarteritis nodosa fall mainly into two groups:

- (a) Infection—(*Spirochæta pallida*, streptococcus, virus, parasite).
- (b) Allergy—(allergic reaction to a variety of toxins, including organic arsenicals, sulphonamides and thiouracil).

None of these theories could conclusively be confirmed so far. The histological appearance in a number of cases strongly suggested the type of reaction occurring in the vessels in the rickettsial diseases but all attempts with appropriate stains, however, have failed to reveal rickettsial bodies. Some authors thought of the possibility that, in certain instances, a rheumatic infection acts as a sensitizing factor and prepares the way for the destructive attack by the infective agent of polyarteritis nodosa. Cohen, Kline and Young (1936) believe that polyarteritis nodosa is a manifestation of clinical allergy so severe that irreversible and destructive lesions occur in the arterial walls and lead to disturbances in function of the organs supplied by the involved vessels. They consider every patient with severe allergy as a potential candidate for polyarteritis nodosa. Others thought of a hyperergic defensive reaction of the small arteries and arterioles to a variety of toxic and infectious factors. This belief receives support by the frequency with which preceding or concomitant infections are seen in cases of polyarteritis nodosa. It has further been suggested that many of the unexplained fibrosed or recanalized blood vessels which, in the past, have been encountered in routine post-mortem examinations and biopsies, and which have been previously brushed aside for want of explanation, may have been healed lesions of polyarteritis nodosa of varying degree, caused by various agents which had existed as localized lesions or which had remained unrecognized during life. Rich (1942) reported a series of cases in which typical, fresh lesions of polyarteritis nodosa were found in patients who came to autopsy shortly after having had serum sickness or hypersensitive reactions to

sulphonamides. A typical diffuse polyarteritis nodosa had been produced experimentally by establishing a condition analogous to serum sickness in men. Rich and Gregory (1943) claim to have demonstrated that polyarteritis nodosa is one manifestation of the anaphylactic type of hypersensitivity and they came to the conclusion that widely different types of sensitizing antigens are capable of causing polyarteritis nodosa in men. This view seems to be supported by the frequent coincidence of asthma and polyarteritis nodosa.

CASE RECORDS

C.Q.M.S. "X," aged 37, was first seen in the outpatient department of a military hospital in July 1948 and he was admitted a few days later. He looked ill and complained of general malaise, weakness, slight cough, abdominal pain, anorexia, sweating and loss of weight.

History.—He had always enjoyed good health. Three months ago he developed a number of small boils on trunk and limbs. A diagnosis of impetigo was made and the treatment consisted of two injections of penicillin and local applications of penicillin ointment. The condition improved, but the skin lesions never subsided completely and occasionally new eruptions developed. He stated that five weeks prior to admission he thought he caught a cold which left him with a persistent cough and some shortness of breath. Two weeks later he was suddenly seized by a very sharp pain in the "stomach" after he had a few drinks. He felt sick but he could not vomit. This pain was localized in the right hypochondrium and epigastrium and had persisted, more or less, ever since its first onset. It had varied in intensity and seemed not to be related to meals. He thought his cough had improved since the abdominal pain had developed and he had lost over 1 stone within the preceding two months. There were no other abnormal symptoms.

Examination.—Rather thin, pale and ill looking man. Temperature 99, pulse regular, rate 100 per minute, respirations 26. Skin: scattered septic lesions on trunk and extremities, most of them localized on forearms, fingers and lower limbs. Some were fresh, others were covered by crusts. A few were slightly infiltrated and tender. There was evidence of healed lesions on the trunk in the form of scars and brownish pigmentations. No subcutaneous nodules palpable. No adenopathy, no clubbing of fingers, trachea central. Lungs: hyperresonant, bilateral basal crepitations. Heart: apex beat in 6th intercostal space, 3.8 cm. outside mid-clavicular line, no murmurs, pulse regular, normal volume, equal, rate 100 per minute, blood pressure 165/110, neck veins not distended. Abdomen: liver enlarged (two fingerbreadths), tender, marked tenderness in the epigastrium, spleen not palpable, no evidence of ascites, no abdominal tumour palpable. Examination *per rectum*: n.a.d. Central nervous system: n.a.d. Fundi: no retinopathy. Limbs: no œdema. Urine: massive albumen, no frank hæmaturia.

On the day of admission, three days after he had been seen in the outpatients clinic, he suddenly developed acute pulmonary œdema. There was now tachypnœa, orthopnœa, profuse sweating, ashen-grey pallor, anxiety, cough with slightly blood-stained frothy sputum, pulse irregular, soft, rate 160 per minute approx., blood pressure 180/120, temperature 101°. On examination there were moist coarse râles over both lungs extending up towards both clavicles, the liver was now much more enlarged and tender and its edge could be felt in the region of the umbilicus. There was evidence of sacral œdema and slight swelling of both ankles.

Progress.—The emergency treatment consisted of morphine, atropine, and mersalyl. Digoxin 0.5 mg. was injected intravenously. All signs and symptoms of pulmonary œdema subsided within a few hours but the tachycardia persisted and the pulse remained elevated between 120 and 130 per min. in spite of continuing treatment with digoxin per mouth. The blood pressure did not fall below 165/110 and the

temperature varied between 99.2°–101.4°. The general condition of the patient, however, improved and his abdominal pain subsided. Later pulsus alternans, frequent extrasystoles and gallop-rhythm developed and digoxin had to be reduced and eventually discontinued. As the temperature occasionally rose to 102° and as more septic skin lesions developed a large course of penicillin was decided upon and a prolonged course, extending over six weeks, was commenced, a total dosage of 20 million units being given by intramuscular injections. In the course of this the temperature became normal and the skin lesions subsided. The tachycardia persisted, however, and a rough systolic murmur which was loudest medial to the apex beat developed. The urine continued to show albumen and occasionally red blood cells and signs of increasing myocardial involvement became more and more marked clinically and by repeated electrocardiograms. The patient died of heart failure, seven weeks after admission.

INVESTIGATIONS

Blood: W.B.C. 10,500 per c.mm. - 12,500 (75 per cent polymorphs), no eosinophilia, Hb. 70 per cent (Sahli), R.B.C. 3,500,000 per c.mm., blood urea 40-60 mg. per ml., E.S.R. 97-109 mm. in one hour (Westergren), repeated blood cultures sterile, W.R. and Kahn negative.

Sputum: No acid-fast bacilli seen, no predominant organism in repeated examinations of specimens.

Urine: Persistent heavy albuminuria, occasionally red cells, no casts seen, culture sterile.

Electrocardiograms: Three tracings were taken during the course of the illness and a constant change was observed. All of them suggested left axis deviation and severe myocardial involvement. The first electrocardiogram, taken soon after admission, showed changes of T and S-T in lead 1, 2, and 4 (precordial lead) suggesting involvement of the myocardium of the anterior wall of the left ventricle (fig. 1A), while fig. 1B and fig. 1C revealed notching and broadening of the QRS-complexes, suggesting bundle branch block. All these changes, however, could be interpreted as digitalis effects.

X-rays of Chest: At first showed acute pulmonary œdema and enlargement of heart.

Six days later, showed the response to treatment and the subsidence of pulmonary œdema.

POST MORTEM

Heart: Pericardial sac dilated, containing 80 c.c. of clear, yellowish fluid. Pericardium translucent, no adhesions. Heart: weight 500 grammes. Generalized enlargement, the apex formed by the markedly hypertrophied left ventricle. Coronary arteries straightened, along the lines of the vessels all branches show small nodules, grey and greyish red in colour resembling chains of small pearls, sharply defined and appearing to be multiple small aneurysms (fig. 3). These are particularly well seen on the posterior wall and on the margo acutus. The descending branch of the right coronary artery shows a double row of these nodules and they are also seen on the branches of the left coronary artery, but with multiple smaller miliary and submiliary nodules, some hardly recognizable macroscopically, on their branches. There was no evidence of hyperæmia. All cavities of the heart dilated and their muscular walls hypertrophied. Right ventricle at conus pulmonalis 6 mm. in thickness, with trabeculæ round and large. Left ventricle, thickness 18 mm., myocardium stiff and firm, no evidence of ischæmic infarcts or scars. Endocardium normal, all valves normal. The lumen of the descending branch of the left coronary artery is not obstructed and the above described nodules appear not to originate from the main branch, but seem to be nodular thickened walls of the smaller branches. The aorta is narrow and elastic, only very slight thickening of the intima in its lower parts can be seen. The intercostal arteries are affected in a similar way as the described coronary arteries.

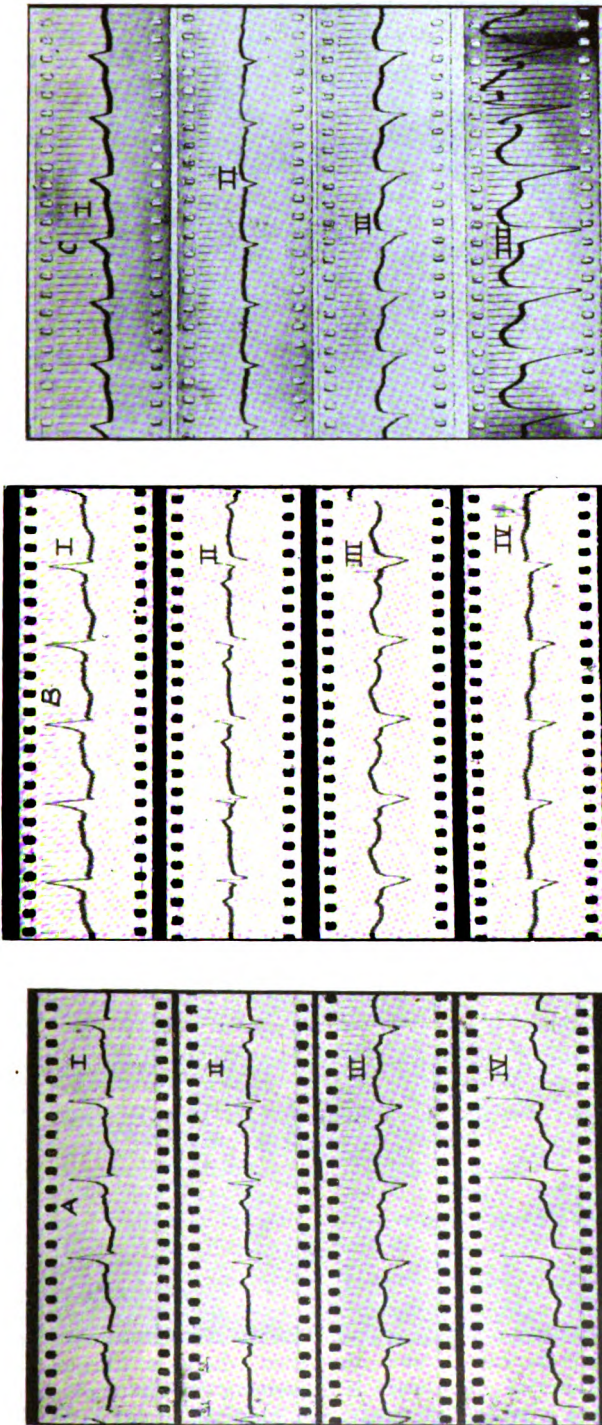


FIG. 1.—Electrocardiograms showing left axis deviation and myocardial changes.

- A. One week after admission. Changes suggest T1 type infarction.
- B. Three weeks later. Widening of QRS Complexes suggesting branch block.
- C. Two weeks before death. Low voltage in lead II, bundle branch block.



FIG. 2.—Posterior wall of heart showing descending branch of right coronary artery with nodules along the vessel.

Peritoneal Cavity: Contained 250 c.c. of yellowish clear fluid. No adhesions. The serous membrane of the stomach and of the intestines show multiple small greyish-white nodules on the lines of the branches of the mesenteric arteries.

Liver: Weight 1,830 grammes. Some small, irregular, greyish-red areas which proved to be hæmorrhagic infarcts on cut surface. The branches of the hepatic artery show the same nodular lesions as described above. The lumen of the nodules is either narrowed or thrombosed. Gall-bladder and ducts normal.

Spleen: Weight 190 grammes, firm and smooth. The vessels show small nodules macroscopically.

Pancreas: N.A.D.

Suprarenal Glands: Small, the cortex decreased, brown, with lipoid considerably diminished.

Kidneys: Right kidney: weight 160 grammes. Left kidney: weight 150 grammes. Both organs stiff, the capsule difficult to strip. The surface of both kidneys shows a number of dark greyish-red fields, some of them sunken, others elevated. The cut surface shows multiple grey, miliary nodules.

Urogenital Tract: Macroscopically n.a.d.

HISTOLOGICAL EXAMINATION

Heart: Sections of the wall of the right ventricle and auricle show several small branches of the coronary arteries with circumscribed nodules and aneurysmal dilatations. The wall of the vessels is considerably thickened, there is fibrinoid necrosis, the structure of all membranes of the vessels is indistinct, the elastica and muscularis is destroyed and there is a marked inflammatory infiltration of all layers including the

adventitia. In some areas the vessel wall cannot be recognized and is replaced by a fibrous tissue with round cells and many newly formed vessels of the type of giant capillaries. In the adventitia small round cells seen, mostly plasma cells. The "elastica interna" can only be recognized with great difficulty. The intima is considerably thickened everywhere and the lumen is narrowed or partly obliterated by the changes in the internal membrane. In some areas the lumen is obstructed by thrombi which are fresh, organized or in the state of recanalization. Many newly formed giant capillaries are seen in these thrombi. The myocardium shows considerable hypertrophy of the muscle fibres. The nuclei are very big and irregularly shaped. In the ventricular wall only a few small infarcts are seen. The auricular wall shows larger areas of fibrous tissue, which have only a few nuclei and are situated between the muscle fibres (fig. 3).

Brain: Considerable venous congestion in the cortex of the left frontal lobe. Small areas of softening with destruction of the nervous tissue.

Liver: Considerable venous hyperæmia and œdema. The branches of the hepatic artery show changes similar to those seen in the coronary arteries.

Kidneys: Arterial lesions similar to those described previously. The cortex shows small fields of scar tissue but no fresh ischæmic necrosis. The glomeruli partly hypertrophic and congested. Frequent periglomerular infiltration of round cells. Here the venous hyperæmia is also considerable.



FIG. 3.—Section showing myocardium with hypertrophy of muscle fibres and fibrosis. The vessels are thickened showing thrombi some obliterating the lumen. (Low power.) Magnification 100 approx.

Spleen: Hyperplasia of the follicles and pulp. No arterial changes seen.

Intestines: In the adventitia of the smaller arteries there are also a number of nodules. All veins hyperæmic.

Pancreas: n.a.d.

Suprarenal Glands: A group of smaller arteries show arterial changes of the vessels with marked fibrinoid necrosis and chronic inflammatory infiltration of the wall.

Thyroid: Venous hyperæmia, otherwise n.a.d.

Lungs: Pulmonary arteries n.a.d. Venous hyperæmia of vessels and capillaries. Alveoli dilated. Hæmosiderosis in alveolar epithelium.

Tonsils: Chronic inflammatory changes. Epithelium and crypts infiltrated by inflammatory cells. In a few crypts there are cell debris and necrotic tissue. In the arteries there are similar changes to those described previously.

Lymph Glands: Chronic sinus catarrh, the vessels n.a.d.

Skin: n.a.d.

Prostate: Parenchyma n.a.d. A few small arteries show the same arterial changes as previously described.

Aorta: n.a.d. A small branch of an intercostal artery shows a nodular round cells infiltration in the adventitia with an area of necrosis.

DISCUSSION

The difficulties presented by a diagnosis of polyarteritis nodosa during life can be explained by the variety of signs and symptoms of the condition. If one is justified in classifying the disease into various types, which is questionable, the reported case could be regarded as "cardiac type." The presenting symptoms were those of hypertensive congestive heart failure with transient pulmonary œdema. The clinical signs of pulsus alternans and gallop rhythm and the changing electrocardiograms were in favour with such a diagnosis while the persistent tachycardia and temperature and later the appearance of a rough systolic murmur were rather suggestive of a myocarditis. The apparent response to penicillin, shown by control of the temperature and the septic skin lesions, pointed to an infective cause. The high sedimentation rate was in full agreement with such a view. Even the abdominal pain would still have fitted in and could have been interpreted as evidence of multiple embolism in a case of endocarditis. Repeated negative blood cultures, however, the very moderate leucocytosis and the massive albuminuria in the absence of any appreciable hæmaturia were rather against a diagnosis of bacterial endocarditis. The acute onset of abdominal pain which is so often met in this condition may have been due to liver infarcts as revealed by the post-mortem findings. Pass (1935), in a review of the cases of hepatic infarcts in the literature, found polyarteritis nodosa to be the most frequent cause of such lesions. In fact Arkin (1930) has said that hepatic and renal infarcts in the absence of endocarditis should make one think of polyarteritis nodosa as the cause. The systolic murmur which developed eventually may have been caused by a relative mitral incompetence due to the rapid enlargement of the heart as there was no evidence of endocardial involvements at autopsy. The persistent tachycardia, out of proportion to the fever, the massive albuminuria, the lack of response to digitalis, the high sedimentation rate and the fact that the patient was obviously not aware of the gravity of his condition were considered as characteristic features in the reported case.

SUMMARY

Some of the publications relating to polyarteritis nodosa are briefly reviewed and the pathology is discussed.

The original view that the condition carries an almost 100 per cent mortality has been modified and recent observers are quoted who state that more than 50 per cent of the patients recover. The possibility that the disease may run a prolonged intermittent course for many years is put forward. A few of the many theories regarding the ætiology of the disease are mentioned. Of these the "allergic theory" is the more modern one.

The similarity of the histological changes in cases of polyarteritis nodosa and temporal arteritis suggests a common abnormality which may be a sensitizing antigen in both disorders. This would support the opinion of some observers that temporal arteritis is "an odd and relatively minor variant of periarteritis nodosa," White (1944), or a local manifestation of a more widespread disease.

Finally a case of polyarteritis nodosa, chiefly presenting cardiac symptoms, is recorded. Necropsy revealed the typical macroscopical and histological lesions in almost every organ, most marked in heart, liver, kidney and intestines.

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SIR JAMES McGRIGOR, BART.

Surgeon-General Sir James McGrigor, Bart., K.C.B., F.R.S.,
Director-General of the Army Medical Services

BY

S. LYLE CUMMINS

[At the time of his death Colonel Lyle Cummins, formerly Editor of the Journal of the Royal Army Medical Corps, was writing a life of Sir James McGrigor. We are privileged to be able to publish the uncompleted manuscript through the kindness of Maurice Cummins, son of Colonel Lyle Cummins.]

PART I

THOSE of us who wish to recover from the past the appearance and manner of Sir James McGrigor as he presented himself to his brother officers as their D.G., and as a man, must study the statue of him placed outside the R.A.M.C. Mess and just opposite to the Tate Gallery, and the even more characteristic picture of Sir David Wilkie which adorns the Mess Dining Room. The statue shows him as a fine and upstanding figure, well calculated to dominate and impress those around him; but it must be remembered that it was a work from existing portraits and, perhaps, from memory, erected after his death in 1861. The picture of him by Wilkie has a much truer note, placing him before us, just as that supreme artist saw him, in his daily life, and with a wonderful expression of kindness as if, out of the portrait, he were talking to us as friends as he was wont to do to his contemporaries. If we require a description of him, we have only to turn to Jackson's "Sketches of National Military Character," where the Highland officer is set forth as a type: "The countenance of the higher class of Highlanders is for the most part strongly marked as a warlike countenance; the face is broad, the cheek-bones high, the visage manly and stern rather than comely." But, indeed, we must plead, for the Highlander concerned, that the alleged absence of comeliness is not to be discovered in this portrait!

"Some of them," goes on Jackson, "certain classes of them, have a sagacity and penetration in things connected with war which exceeds the common measure of sagacity among other nations." This description of the characteristics of the Highland officer serves well for Sir James McGrigor. He had all the appearance of a soldier and all the sagacity, in things connected with war, which could be required of him. He associated as a friend and as an equal with all the greatest soldiers of his time and displayed a sagacity for war, if not superior, at least equal to theirs. Wellington was a man to appreciate

qualities of this sort. We see it in one of McGrigor's first interviews with the Duke. On going to make his reports he found himself in the same waiting room with the Adjutant-General and the Commissary General and was told by the former that, in future, he need not come to see the Duke but must come to his, the Adjutant-General's, office to explain all his difficulties and have them passed on. This was rather surprising to McGrigor, who had been told by the Duke to come straight to him, and he rather wondered what to do. However, as he says in his autobiography, "At that moment the door of his inner apartment was opened by Lord Wellington who, nodding to me, desired me to come in." This, doubtless, was a tribute to the man himself, but direct dealing was the Duke's habit and the method of explaining things to the Adjutant-General and leaving the latter to make them clear to the Commander in Chief, is still the type of mistaken policy to which the chief doctor is exposed, despite the example set by the Duke of Wellington. Here it was a case of two interested personalities: that of Wellington and that of McGrigor. The Duke *knew* quite well that here was a man to make his own reports.

We give this as a case of one soldierly personality in contact with another. But many instances might be found. McGrigor was a man and a soldier. That fact was seen and noted by all his Commanding Officers and all received him as one of themselves. He was born in 1770, the eldest of three sons of Colquhoun McGrigor, a merchant of Aberdeen, by his wife, Ann, the daughter of Lewis Grant, Esq., of Lethendry in Strathspey. We pass lightly over his boyhood, merely noting that he was at the Grammar School at Aberdeen and afterwards at the Marischal College where he took his A.M., passing on to the career of medicine. It is to be noted that he was, while attending at the hospitals, greatly struck by the "marshal" appearance of one of his old college friends who had lately joined the Army and who had come to improve his mind by seeing a few more cases and hearing once more the Professors at their work. This episode he recounts in his autobiography and it seems, at his then age, to have impressed him greatly and, perhaps, to have helped to determine his future career. Costume makes just such an appeal to the young adult! At any rate he proved a remarkable student and, with a second young doctor, Robertson by name, managed to assemble the other students and to lay before them the plan for a Medical Society of Aberdeen. This was in 1789 and it is a remarkable thing that the Society still exists, grown now to an extent that would probably surprise its authors of those early days. Yet we have the best reason to believe that one of its authors, McGrigor, saw clearly the rise and growth of it to a wonderful place in the medical life of the City, "I watched its advancement and its success with the anxiety of a parent. By my own subscriptions, donations of books and continued warm importunities to my numerous friends, I obtained no small proportion of the funds required for the erection of the handsome building which the Society now possesses." The Medical School of Aberdeen still owes a great deal to the watchful eye and the ready hand of this young Army Surgeon, ambitious for the future greatness of his pregnant idea.

THE CONNAUGHT RANGERS

McGrigor now began seriously to consider how best to make use of his life as a doctor with a great deal to give and a great deal to receive from a smiling and beckoning world. After a year or two and a time in London he decided to make his career in the Army, having got his father's consent and a promise of financial help. Accordingly he entered into negotiations with a Mr. Greenwood, of the Army Agency of Cox and Greenwood, for obtaining a commission by purchase and was told of a probable vacancy in General de Burgh's regiment which was being raised at Chatham. He heard, however, that de Burgh's regiment would be an Irish one and hastened to tell Greenwood that he, as a Scot, would very much prefer a Scottish corps. Mr. Greenwood, however, was able to speak with some authority here. "Your prudent country men," he said, "will soon make their way in an English or Irish regiment but, in one of their own Corps, there are too many of them together; they stand in each other's way." We are not given Mr. Greenwood's own country of origin but we should be inclined to think that it was England. At any rate he was evidently a careful student of the after-careers of the men whom he placed in the Army. What could be better advice? McGrigor took it and soon found himself in the 88th Regiment, the Connaught Rangers. Alas for the Connaughts! It is sad to think that this fine regiment, with its glories so gallantly won during about one hundred and twenty-five years, should now, with its noble companions, the Munsters and the Leinsters, be no longer with us. How well I can recall their fine discipline, their wonderful gallantry in action, their splendid appearance on parade; they were one of the smartest and best regiments in the service during the First World War—and now they are no more. McGrigor was one of the first to join them. He and a Major Kepper were the only officers of other than Irish extraction in the Battalion being raised at Chatham. The others were all from Galway; most of them related to each other or old friends; evidently a good lot. This is what McGrigor thought of them: "But I must say there were never a finer set of young men, with more appearance of being the sons of gentlemen, congregated in any corps in His Majesty's service." They differed, too, in one respect, from what is traditionally the favourite vice of Irish regiments: they did not go in for heavy drinking. On the contrary, they had an arrangement by which, at a given signal, they all rose from the table—of the common Mess of the various battalions being raised at Chatham—before the wine had gone round too often and before the results had become too bad, and returned together to their quarters. On the very first night of McGrigor's stay in the lodging house where he and others had been billeted, he heard a lot of stumbling and noise outside his room in the passage and, to his horror, found that it was caused by bringing home the body of a youngster who had been killed in a duel! And, very shortly after, he himself was involved in sending a challenge to a very dear and intimate friend. It happened as follows: McGrigor was just rising from table at the little signal which had been passed round to the officers of his regiment but he was delayed, out of

fun, by a man called Sparrow who placed an arm over his shoulder and tried to get him to stay a while and have another glass of wine. A Captain Nicholson of the 88th was also embraced by another officer and held for a moment just as had happened to McGrigor. Both got free and went outside to rejoin the others; but they were struck dumb with surprise when they were told that an insult had been offered to the Corps, two officers having been forcibly detained on rising from their seats! Had not all the officers of the Connaughts seen their brother-officers being forcibly kept at table when they had tried to rise? It was vain for Nicholson and McGrigor to protest that the whole thing had been the merest joke and that no insult had been intended. A council of officers was assembled, the circumstances were considered, and finally both officers were requested to send challenges to those who had had the audacity to hold them forcibly at the table when they had decided to rise! And to send the challenges they were forced; doubtless with private notes explaining the matter. Both those involved said that they were willing to apologize but this was not considered enough by the fire-eaters of the 88th. The officers were told that no apology could be sufficient unless made on Parade before the troops assembled! Fortunately the two officers were sincere in their desire to get out of an awkward situation and both consented to make their apologies publicly and so the situation was saved. I have come across a few notes about the subject of duelling in an old *Encyclopædia Britannica* of 1877. It may be of interest to recall that it was at its very height in England and especially in the British Army towards the end of the eighteenth and the beginning of the nineteenth centuries. "In 1808 Major Campbell was sentenced to death and executed for killing Captain Boyd in a duel. In this case, it is true, there was a suspicion of foul play. . . . In 1843 Colonel Fawcett was shot by his brother-in-law, Lieut. Monro. The survivor, whose career was blasted by the event, had gone out most reluctantly in obedience to the then prevailing military code." These two cases, both ending in tragedy, show what a curse duelling actually was from a hundred to a hundred and fifty years ago; there must have been many cases in which the event was less fatal or in which, for one reason or another, the duel was not brought to the notice of the authorities. By 1877, the law was that "Every person who shall fight or promote a duel or take steps thereto, or shall not do his best to prevent a duel, shall, if an officer, be cashiered or suffer such other penalty as a General Court Martial may award."¹ Such regulations did not, of course, exist in McGrigor's time but the two occurrences in which he was involved had the effect of showing him the great danger of getting mixed up in quarrels. The second, too, had a further salutary effect for it led to his being told off sharply for drunkenness as, in the course of celebrating the event with Sparrow after the latter had apologized, he got very much the worse for liquor and was spoken to by his Colonel about it!

The 88th was, in 1794, ordered from Gravesend to Jersey, the French

¹ *Encyclopædia Britannica*. The Duel. P. 514. Vol. VII. 9th Edit. MDCCCLXXVII.

Revolution being now at the height of its violence and many refugees fleeing from their homes to the Channel Islands.

A good story is told by McGrigor of a young French Marquise who landed on Jersey and made very good friends with the wives of the officers. Then, suddenly, the news came that her husband had been taken by the Revolutionaries and guillotined. She was literally overcome with grief. But, in the midst of her sorrow, news arrived of a Ball to be given by the Governor. It was the third day of her widowhood and this Ball, they thought, could have no interest for her! She merely asked "if it would be proper for her to go to the Governor's Ball in mourning."

France had declared war on England in 1793 and it was probably this fact that had led to our sending additional forces to the Channel Islands. The Connaughts settled down, nevertheless, to have as good a time as they could. Typhus fever, however, attacked the regiment and took its toll of them, and McGrigor, who had attended the sick, was himself stricken with the disease, very badly, too, as were most of the youngsters attacked. He was attended by his friend, Jackson, surgeon of the Buffs, and gradually recovered but was ordered into the country to regain his strength. How to get there was the question; but the men of the regiment, who had already, no doubt, learnt to value their medical officer, "solicited to carry the 'doctor' to his place of convalescence and this request was acceded to." Meantime, things were moving fast and, while McGrigor was convalescing in the country, orders came for his regiment to proceed to Ostend. The news of this move came as a dreadful disappointment to McGrigor and, though he knew himself to be quite unfit for the job, he pleaded so strongly with Kepper, now the commanding officer, that the latter finally allowed him to be carried aboard the transport, weak and feeble as he was, and thus he was enabled to proceed with the Battalion. Once upon the sea, he gained strength rapidly and was soon on duty again.

They reached Ostend, passed up the Scheldt by Flushing, and landed at Bergen-op-Zoom. It must have been a curious experience. The garrison was made up of all kinds of troops; there were Dutch troops, Nassau troops, troops of the French Emigrant Corps, Germans and, lastly, two British regiments, the 88th and 87th, both of them quartered close by at Breda.

Typhus fever was still prevalent and McGrigor got what he thought another attack of it. Both he and his Assistant, Nicholl, appear to have had a bad illness from which, however, they recovered fairly quickly. This may have been severe malaria but could hardly have been typhus again if it was typhus which McGrigor had had in Jersey. They were now in the "Low Countries" and we know, from the writings of Sir John Pringle, the great military surgeon, how very common such fevers were wherever the subsoil water was high and the country liable to flooding.

"These people are more or less subject to intermitting fevers," he says, "in proportion to the distance of the water from the surface so that by looking into the wells one may form a judgment of the comparative healthfulness of

the surrounding villages.”¹ This most acute observation, the significance of which was still unsuspected, fits in beautifully with the prevalence of the mosquito and explains much of the fever to which the troops now became so liable. It offers, incidentally, an explanation of McGrigor’s attack.

Here the first clashes with the French occurred but very little notice is taken of these by McGrigor in his autobiography. He was probably ill for most of the time at Breda and very busy when fit to do his work as medical officer at other times. Nor was the stay of the regiment there prolonged. Captain Popham, R.N., later to be very famous as Sir Home Popham, appeared at Bergen-op-Zoom and, “on a very dark night conveyed the 88th . . . to Transports in the Scheldt” and landed them again at Bomell whence they marched to Nimeguen. Here they were inspected by the Duke of York himself who was, no doubt, in great hopes of a crushing victory over the French. McGrigor had the honour of being presented to him, a meeting which the Duke, with the extraordinary memory which he, in common with his princely relations, recalled quite distinctly and referred to twenty years later!

Nimeguen was closely invested by the French and received constant attention from their artillery. One knows by experience what it was to be in the city of Ypres under similar conditions of bombardment by the Germans and, even allowing that the type of projectiles were much less deadly as used on Nimeguen, it must have been very unpleasant! McGrigor was in charge of the wounded, not only from the 88th but also from the 78th regiment, the Surgeon of the latter being ill. He had the wounded collected in a large Church and made the position safer by marking the Church with the Hospital flag. But again we are reminded of the bombardment of Ypres. Neither the French of 1794 nor the Germans of 1915 spared bombardment of a sacred building protected by a hospital flag. It is possible that both were actuated by the fear that we should do what they probably would have done in our place—fill the Church with armed men and hoist not one but many hospital flags over them to protect the building! At any rate they shelled the Church heavily and McGrigor, as he dressed the wounded there, saw shell after shell pierce the walls, some of them burst, and scattered *debris* over the interior. At last the danger became too great and he was obliged to shift his charges to another and more protected place. Alas for the Duke of York! “The difference between the warfare he had learnt and the warfare he, in fact, found was immense. Instead of the rolling plains of Silesia the broken country of the Netherlands, instead of gentlemanly opponents, men who fought like tigers knowing that defeat meant death from their tyrannical government.”² The evacuation of Nimeguen became inevitable and was arranged at night. It was obvious from the start that three British Battalions, no matter how good, could make no head against the French nation in arms against them. The troops

¹ “Observations on the Diseases of the Army,” by John Pringle, The First Edition corrected, London, MDCCCXV.

² Royal Dukes. Richard Fulford. Pan Books Ltd., 1948.

were marshalled very quietly and under the protection of darkness moved towards their crossing places over the river. The 88th, after a long wait and much delay to allow of the return of an officer sent for orders, at length got under way at 2 a.m. and very silently got to the Bridge of Boats. McGrigor had some trouble at the Bridge Head, an officer in charge there objecting to his bringing his horse, but a drummer of his regiment saved the situation by taking the animal in charge and getting it over with other transport later. "We were marched off towards Arnheim," says McGrigor, "where we halted for several days." Here McGrigor got a severe attack of fever and was hurried off some distance to Emden, a town in Germany, along with Captain Machonnochie another officer of the Connaught Rangers who was also sick.

Emden seems to have been a good place to convalesce in. Both officers got much better there and, after a certain time, were able to rejoin General Abercrombie's Headquarters, this time at Bentheim. From this German Headquarters they made their way with the regiment to reach the sea. "Our march through North Holland," says McGrigor, "was a rapid one, closely pursued by the enemy, and disease continued to make great ravages." He does not refer to any towns passed on the way but we may presume that the route lay along a course near Naarden, Muiden, Leyden, and onwards. One night, three officers, of whom McGrigor was one, had a house allotted to them and to three reduced Companies. The family appeared to be in great distress, a number of girls and women weeping and imploring them not to enter a locked room which stood invitingly near. Under stress of necessity, however, they broke down the door and entered. Judge of their horror when they found the aged grandmother of the family dead in the only bed in the apartment! The utter fatigue and weariness of a retreat, however, knows no mercy and they ordered the removal of the corpse and, all three of them, got into the bed in their clothes and slept the sleep of weary men.

On the following morning, McGrigor could not leave his couch, being stricken with a severe fever which he recognized as typhus but which we must conclude to have been something else, probably a malignant malarial attack. He was so ill that he could not stir and decided that he must remain rather than go on with the regiment, a desperate decision, but he felt quite unable to move. Then his good angel, Machonnochie, appeared, told him of the numerous officers and soldiers already murdered in revenge for the burning of farms and houses, played thoroughly on his fears and finally got him up and placed him on, or rather across, his horse and took him along as best he could. Once in the open air he got much better. Then a cart was requisitioned from a farm house, he was moved along in this for a day or two, and, when he regained consciousness, found himself on a truckle bed in a large farm where he was well tended by the farm people, an old man and his wife. As he gradually regained his senses he noticed that his shirt was stiff with something that reminded him of dried blood but which proved to be the remains of a mixture of bark and port wine which his servant had seen fit to force down his throat whenever he could!

Let us admit that the servant had merely tried to give him something of use for the fever; but what a wonderful mixture he had chosen! Port wine as a tonic and pick-me-up and, above all, bark, the very thing for his malarial condition! McGrigor appears to have thought this remedy a somewhat unclean one and chiefly as a means of staining his shirt—but it probably saved his life. "The two other officers died here," he says, though he does not mention who they were; but it must have been a particularly bad brand of malaria to which they were all exposed. The farm-house was close to Breille, he says, a port with ships on it. This was probably Brill, a harbour close to Rotterdam, to judge by the map. "On the following day," says McGrigor, "my ancient host brought a wheelbarrow into my apartment, stuffed with straw and blankets; on this I was placed by my host, hostess and servant" and this was wheeled out to where he could see the masts of the ships, but it was useless, he could not stand up and had to be wheeled back again. Here he fell into a deep sleep from which he woke refreshed and filled with a determination to get to a vessel next day. Then, a day having passed, he got down to the beach in his wheelbarrow, was helped by a naval officer there, was rowed a long way out to the transport on which the 88th was accommodated, was recognized, kedged up the side in a chair let down for the purpose, and taken into the life of the regiment again with the greatest kindness of officers and men.

ENGLAND AGAIN!

What a wonderful relief it is, even in the most extreme measure of illness and misery, to feel oneself among friends again and to see around one nothing but kindly and familiar faces after a long semi-obscurity of strange voices, strange happenings, strange languages, driving one onwards through a hostile world! And the sea! What restorative can be like the sea! McGrigor yielded himself, with nothing but the half-consciousness of convalescence, to the influence of the sea, the fresh breezes, the kindly attentions of companions, the happiness of getting well. Machonnochie must have been there and many old friends of the regiment. "And by the time we cast anchor at Yarmouth," says he, "I was able to come on deck; and we now enjoyed what for a long time had been unknown to us, English wheaten bread, butter and milk, with tea and sugar!" This was luxury indeed after the food from which they had suffered for many months. They landed at Harwich and McGrigor, with Machonnochie, went to Ipswich, being unable to march as yet, I suppose, and liking the short journey by car. The regiment marched to Norwich and took up quarters there. McGrigor must have joined them there after a few days, picking up his health again, and re-commencing his regimental duties. There was quite a large garrison at Norwich—the 88th, the 53rd and the 2nd Dragoon Guards and others—concentrated there to keep the people quiet.

For it is the greatest mistake to imagine that England was indifferent to the revolutionary strivings of France; there was much sympathy with the movement in the eastern counties and nowhere more than in the area of which

Norwich formed the centre. There was much disorder around, both in the town and outside it and a large garrison was very necessary. "In the course of time and after the soldiers had had many encounters with the townspeople, we got the mastery of the democrats and levellers, as they were called, and an association of responsible tradesmen formed against the republicans." McGrigor must have enjoyed this excitement and he was specially pleased, during this time, to receive an order from the Medical Board to assume responsibility for the medical arrangements of the whole force; an appointment which he held until the regiment went on to Chelmsford.

It was at Chelmsford that they heard the news that an expedition was to be sent west to capture the French West Indian islands and that the 88th was to form part of it. This rapid re-employment on active service was a feature of military service in a small Army serving a nation with wide responsibilities; and it seems to have been borne with their usual fortitude by the Connaught Rangers. The regiment was destined to form part of an expedition under General Abercrombie, who had commanded in the Netherlands under the Duke of York, and who was now to take on this duty as an independent command. It moved to Southampton to form a part of the expedition which was to sail from there. The Connaught Rangers were now under a new Commander, Lt.-Col. Beresford, a man whom McGrigor at first found anything but to his liking. One source of this dislike was his reception by the Colonel on going to report on his duties. He had got the regimental hospital into first-rate order in preparation for an outbreak of typhus which he feared might occur at any time, and he went prepared to be praised a little or at any rate not blamed. But when he entered the office and saluted, expecting to be invited to sit down and make his report at ease, Beresford neither noticed his salute nor invited him to be seated. After a few minutes, McGrigor sat down and awaited the next step. The C.O. now took the sick report and, after a glance at it, "This state of things must not continue. I will *not* have such a number of sick in my regiment." He implied that McGrigor was being got at by a number of malingerers. The latter, on the contrary, informed him that the number of sick would soon be doubled and spoke of the various things that were going wrong in the Battalion.

One can almost hear them at it, hammer and tongs; the usual conflict between an irritable Commanding Officer and a stiff-lipped medical officer, respectfully bent on justifying himself. At length Beresford jumped up, took the Adjutant and the Quartermaster with him, and required of McGrigor to show him all the things that the latter had said were wrong. Now commenced a walk through the lines, the C.O. damning and blasting everything and everybody for all sorts of faults, real or imaginary. Finally McGrigor invited him into his hospital and Beresford had to admit that he could find no fault with things there. He said this, however, without any apology for his previous rudeness. The result was that McGrigor sat down and wrote to an Agent that he wanted to get another regiment, "any regiment," rather than remain

in this one. Now it happened that McGrigor's brother, in the 90th, had just returned from America and naturally was asked by him up to lunch in the Mess. There Beresford must have noticed him and thought him a nice youngster. He sent for McGrigor, therefore, and asked whether the latter would try to persuade his brother to join the 88th. This led McGrigor to a clear statement about his grievances and the announcement that he himself was about to leave the regiment. Beresford seemed much surprised and, later on, sent for McGrigor, took him by the hand, and "made it up" as best he could, expressing his sorrow for what had occurred. He told McGrigor that his department was the only one he could praise and that he had so reported to the Horse Guards. "In short," says McGrigor, "we became friends, warm friends, and continued so ever after." One result of this reconciliation seems to have been that McGrigor cancelled his application for transfer elsewhere, and another, that he advised his brother to apply for the 88th. This brother is mentioned as belonging to the Connaughts at intervals afterwards and there are other entries which show that the friendship was duly observed. So much for a regimental quarrel which was settled to the satisfaction of both parties; both keeping up their positions to the best of their several abilities. This shows that they were both good fellows and speaks well for the position of McGrigor in the regiment.

[*To be continued*]

THE TRAINING OF FIELD MEDICAL UNITS

BY

Colonel F. M. RICHARDSON, D.S.O., O.B.E., M.D.

Late Royal Army Medical Corps

(continued from page 37)

TRAINING EXERCISES

ALTHOUGH a consideration of Exercises has been left to the last it must not be supposed that these are the climax to a period of training. Any such logical progression would soon bore the trainees, and in training there is no objection to letting men run before they can walk. It is in fact an advantage to make them do so, and simple schemes should be done from the beginning of training since they get men into the open air, help to sustain interest, and, even if those taking part in them are too inexperienced to get full benefit, they show the practical application and underline the objects of all other and possibly duller forms of training.

Exercises should aim at ensuring that all ranks think along the same general lines and at the same time should encourage the development of intelligent initiative. If these objects are to be achieved, and if the inevitable unrealities are not to lead to ridicule, so that the C.O. thinks that he has had a useful and instructive scheme whilst everyone else defines it otherwise, it is essential to hold an all ranks post-exercise conference, preferably next day when all have had time to digest the lessons. At these discussions free criticism, comments, and suggestions should be invited from all ranks, and errors of judgment of officers, N.C.O.s and others may be discussed with judicial impartiality. This encourages them to have sound reasons for whatever they do, and does not give offence nor lessen their authority so long as the attitude is insisted upon that we are all learning the game of war together, and that no one solution is necessarily invariably correct. The victims should be encouraged to hit back at the C.O. or Directing Staff in a lively discussion.

If the Field Ambulance is affiliated to a Brigade Group the Regimental Medical Officers and their R.A.P. staffs should attend its exercises to learn Field Ambulance duties. If the R.A.P.s are not represented on the exercises it is impossible to practise one of our most important duties—contact with R.A.P.s which must be visited frequently during battle. The need for this can be emphasized by imposing casualties among the R.A.P. staff or a rush of casualties too great for them to deal with. Other commonly accepted rules can also be practised. The umpire can allot casualties when the unit is on the move or just packing up, since the obvious rule “never refuse to take in a case” was too often forgotten. Units when just about to move sometimes sent an ambulance

to a near-by unit perhaps of another formation which was open. This often had confusing results, and caused unduly prolonged absence of ambulances from the forward area.

On most Field Ambulance exercises the automatic plan for one exchange of stretchers and blankets, the pendulum action by which ambulances and medical supplies are kept moving forward in full replacement of all that comes back, is properly practised; but thought should also be given to what happens when vehicles bringing back casualties do not return to the R.A.P. or C.C.P., as, for example, in a river crossing or when supply echelon or other non-medical vehicles are used to evacuate casualties. On all schemes everything should be loaded in ambulance cars which is normally carried in battle, including one or even two hundred miles of petrol, etc., spare water, improvised cooking outfit and food for patients, and the full kit of the driver and ambulance orderly. Drivers must learn to carry these things without putting anything inside the body of the ambulance, and it is advisable to cover this point in Standing Orders which should include a diagram of the approved method of stowing kit in ambulances. An untidy or improperly loaded ambulance can then be treated as an offence. Slit trenches should be dug during exercises, and they must be properly sited in relation to the needs of camouflage and concealment. If action on air-raid alarms is practised and men are taught to take cover one must be careful to ensure that one's training in this added to their normal instincts of self-preservation do not carry men too far in that direction, so that in action they zealously take cover whenever danger threatens. On occasional schemes everyone may be made to do the job of those immediately senior to them.

If pack animals can be borrowed the problems of their loading and use should be studied. If mules are used in operations the medical unit using them usually has to provide assistant mule leaders and load adjusters, as trained muleteers are usually provided only on a basis of one to two or three mules.

To ensure a thorough knowledge of and compliance with the various D.M.S. circulars and instructions about the preparation of AFs W 3118 and other technical subjects of importance in battle it is a good plan to give to all M.O.s and N.C.O.s down to Staff Serjeants, leaflets containing extracts from these, and to practise their provisions on schemes.

It is important to practise the action to be taken if a site selected for a R.A.P. or C.C.P. is denied to us by enemy action or if the route of evacuation is blocked by shelling, cratering, etc. ALL ranks must learn to study the map for alternative sites and routes, which should be kept in mind when siting such posts. It must be drummed into them that it is their duty to explore for new routes by intelligent, energetic, and resolute probing in a personal reconnaissance, and not just to accept as an unfortunate development their inability to contact the R.A.P., for example, or to sit and wait for someone to tell them what to do. Exercises should be designed as far as possible to test flexibility and intelligent use of the map, and once the basic principles have been grasped

interest can be sustained by altering the country in which schemes are done and by practising methods to overcome the difficulties introduced by rivers, forests, cliffs, trackless country, and minefields.

The importance of NIGHT TRAINING needs no emphasis, and if a continuous succession of night exercises is done for a week or so, a practice which was called "turning night into day," men learn to sleep by day which they must often be compelled to do during operations when a large proportion of our work must often be done at night. Rapidity of dark adaptation and confidence in finding one's way about in the dark can be considerably increased by practice.

If exercises are not to settle into a groove of orderly routine and so to lose reality, unexpected situations and sudden moves, especially at night, must be arranged. It is essential to develop a good drill for assembling everyone from their sleeping places at night and for getting them to their place of work or into the proper vehicles for a sudden move. During the war these and other points were often covered by the writing of so-called ALARM SCHEMES. The purpose of these in medical units is, of course, not resistance to attack but preparation for a sudden move or for a rush of work, or in an attack by ground or airbourne troops the denial to the enemy of the use of our vehicles. They should include the different methods of giving the alarm in various circumstances with details of everyone's action, and should be prepared for different types of warfare and of country, for standing camps, field conditions, and for alarms on the move on foot or in transport. They should be practised frequently especially on schemes lasting more than one day, and during operations they should be read and explained with any necessary emphasis on local conditions after any major change of location.

WATER DISCIPLINE should of course be practised during exercises, and a somewhat unpopular but useful hardening exercise in hot countries is a scheme to accustom men to do with a small ration of water, an ability which can undoubtedly be developed by training and practice. Such practice may perhaps be physiologically unsound, for acclimatization to heat and to altitude are gradual processes which reach completion more rapidly in some men than in others, but it can be justified as a preparation for possible privations during active operations. It can also be explained to men that if they are captured by the enemy it is their duty to escape, and that they will not be presented with a compass and water bottle for this purpose. Preferably only men who have had a reasonable time for acclimatization should take part in the severer forms of such exercises, for they should, if fit, be losing less sweat and also a smaller proportion of salt in their sweat than completely unacclimatized men. They should be sweating "economically"—i.e. losing only that amount of sweat which is sufficient for cooling their bodies, and not soaking their clothing by pouring out pints of unevaporated, and therefore useless, sweat. If they have also acquired a good sun tan so much the better. This can be achieved by making them do all fatigues and marches stripped to the waist, which can be done if only one man in twelve on a march carries a pack with haversack rations.

Incidentally this practice also enables them to keep their clothing clean and hygienic in the desert where water can often not be spared for washing it.

Various types of exercise can be evolved to relieve boredom during a lengthy period of training, and to justify the use of transport for what are really thinly disguised picnics, by including in such expeditions some instructional aspect. For example map reading and navigation can be practised as has already been suggested, by dividing the route into some twenty-four stages by points on the map which should be difficult to identify, and making different men pilot the lorries on the different stages. On one occasion such a picnic was preceded by a schistosomiasis survey of a wadi where this condition was endemic. A lecture on the subject was given and pictures of *Bullinus* and *Planorbis* snails were exhibited on the notice board for some days before the exercise. On another occasion a Water Reconnaissance was done, a supply point being traced to its ultimate sources, and the use of the Horrocks Box and Water Cart and individual methods of sterilizing water for small parties were practised. The use of wireless and the writing of Orders, Messages, and Reports must also be practised.

Bivouacking week-ends, with mountaineering practice or hiking, make a good break in the routine. Each man taking part in such expeditions may be asked to write a complete list of the party's requirements in food, water and other essentials.

When exercises are being done in preparation for any specific task all ranks should be encouraged to give free play to their inventive capacities in evolving special equipment which might be useful. Few Field Ambulances have failed to produce their own patterns of shelter, special bivouac tents and so on, and many of these owe their invention to the private soldiers who had to use and, perhaps, to carry the equipment.

It will help to sustain an interest in exercises and make them more realistic if they can be fitted into the story of an imaginary campaign taking place in the Training Area. This method, which needs careful preparation and for which the original skeleton at least should be provided by the "G" branch of the Staff, is particularly adaptable to a two to four weeks' training camp or to a longer period of collective training. The available ground can be fully used in successive advances by the enemy and by our own side, with counter-attacks, airborne landings, and commando raids. Days when training is being done in camp or barracks represent lulls in the fighting or attacks by other Brigades in the imaginary formation, or by other formations. Ground which is not available for training becomes the scene of operations by flanking formations. A war map with flags and so on showing the day-to-day situation is exhibited on a special notice board outside the orderly room or in the information room, and space should be provided for newspaper cuttings, some of which may be made amusing, for wireless intercepts from neighbouring formations, Intelligence Summaries, and accounts of the interrogation of enemy prisoners. Examples of breaches of security detected by imaginary unit or

Base Censors can also be shown on the board from time to time. Members of other units, or Field Security personnel, can act as enemy agents. In these and other ways a realistically war-like atmosphere can be created which will teach men quite a lot, as well as giving life and interest to all the exercises which are prepared.

Men who have been encouraged to take an interest in such imaginary campaigns will be more intelligent in their interest in a real one, in which their value to their unit is enhanced if they are kept in the picture by daily news bulletins prepared by the C.O. If you tell them everything they in their turn will often pick up a lot of news for you.

OBSERVERS

Members of Brigade Staffs and of other units should be encouraged to attend Field Ambulance exercises as umpires or as critical observers. In this way they will themselves learn something about the Divisional Medical Services and, if they are outspoken in their criticisms and suggestions, we may learn a lot from them. The opinions of all who pass through our hands as exercise casualties should also be sought. The viewpoint of our potential casualties will often be found to be most illuminating, and it is much better to hear their criticisms during training when we can consider them and perhaps rectify the faults which they have detected, than that we should get them in a more acrimonious form and perhaps at second hand after they have been wounded in battle.

CONCLUSION

In this article the Field Ambulance commander will find a guide to taking over his unit, estimating the state of its training, and training it for war. It is by no means a complete guide for very little has been said about the employment and command of medical units in the field or about the medical arrangements needed for specific operations. These may be dealt with under Officers' Training. It is important especially in the early stages of a war that junior officers who are the unit commanders and staff officers of the future should be taught these subjects, which are not, however, exclusively the concern of officers. Much of what they are taught must be passed on to their men in the endeavour to keep them constantly in the picture both in training and during operations. The importance of this and the ways in which it may be done have been mentioned in many of the sections of this article, but it cannot be emphasized too much. The value of keeping men in the picture at all stages of a battle is axiomatic in our modern army, but in training this axiom tends to be overlooked. The aim of training in general and the specific aim and value of each type of training should at all stages and at every opportunity be explained to everyone. By this means only will a sense of purpose and real enthusiasm be maintained throughout long and sometimes necessarily monotonous periods of training. Although there are certain subjects which are of importance mainly to officers I believe that in general the best possible

training for the officers of Field medical units is to make them learn how to train their men under the guidance of a good Commanding Officer.

If time has allowed for the practice of most of the forms of training described here and for putting them into effect in unit, Brigade, and Divisional exercises rendered more intelligible by the kind of teaching outlined, the men of the unit should be versatile and able to adapt themselves to the conditions of all normal operations and, probably with but little specialized training, also to special types of operations. Their enthusiasm and interest will have been better nourished than by an unrelieved diet of squad drill, tent pitching, nursing training, stretcher exercises and Thomas' splint drill, important to their work though these certainly are. The C.O. should keep his eye on the level of efficiency maintained by each man by means of periodic tests of individual training, an example of which is included in Appendix I. Given sufficient time and suitable areas to enable one to repeat and repeat the more difficult subjects with an ever-varying approach to them, very little of all this training is beyond the scope even of any man.

However valuable Selection Groups may be as a rough guide to the most suitable employment for our men I have no high opinion of a Commanding Officer who broods in his office over his men's employment sheets muttering: "How can one train a unit if they WILL post to it all these SG4 and 5 men?"

Get out amongst them and study them for yourself. You have an advantage over the Serjeant Testers and Personnel Selection Officers in that you have much more time in which to observe them at work and at play. Even if a psychiatrist helped in their grading you are also a doctor and well able to judge a man for yourself, and it is possible that you may know more than he does about the training of men and of units. Engage their interest and let them see the objective of all that you try to teach them. Vary your approach to each subject, and by frequent exercises illustrate the purpose of each type of training. Treat them often rather like Boy Scouts and make of much of their training a game, proficiency in which is an achievement to be prized. The soldier always sees the funny side of things and he often sees it before his officers do. Laugh with them as well as at them, and temper normal discipline with a modicum of genial bullying when necessary. Make them take a pride in their unit and formation and in their work, and especially see that they appreciate the inestimable value to an Army in the Field of an efficient medical service, and the source of comfort and strength to men's minds which is given by the knowledge that if they are wounded they will be quickly and capably succoured by friends whose services they have learned to esteem. Give them a sense of purpose, inspire them with enthusiastic leadership, and you will make of them keen and proficient Field Ambulance men.

I have to thank Major-General T. Menzies, *O.B.E.*, *D.M.S.*, *M.E.L.F.*, for permission to submit this article for publication.

[Extracts from the appendices to this article will appear in future numbers.—Ed.]

Retirement



London News Agency Photos Ltd.

The late Mr. Williams with Mr. Pomfret and Major-General John Dowse in the Headquarters Mess, Millbank, March 1949.

It is with some sadness and reflective thoughts on the inexorable precession of the years, that we record the recent retirement of Mr. Pomfret who was so long Hall Porter at the Millbank Mess that, to successive generations of officers, he seemed an essential part of the place.

Pomfret was born in Dublin on June 3, 1883. He was ushered into a then settled and prosperous world by a young surgeon to the Grenadier Guards, who, in the fullness of time, became the first officer to command the Queen Alexandra Military Hospital. He then found this infant the Hall Porter at the Mess.

After service in the Grenadier Guards—his father's Regiment—Pomfret was invalided. He became a mess servant at the Hotel Belgravia in Victoria Street in August 1902, transferred to St. Ermins in April 1903 and to the present mess on its opening in 1907.

There he remained until his retirement in December 1949.

During the first world war, thanks to an introduction by Sir Alfred Keogh, he was employed by the British Red Cross Society as officer in charge of Bulk Stores and Shipping in Alexandria. After service in Egypt and Palestine—where he met many old friends—he returned to Millbank.

During his years at Millbank, Pomfret has kept in touch with many officers who have grown grey and sedate—like himself—with advancing years and long service. They always stopped for a few words, a shake of the hand, and reciprocated good wishes when calling at the Mess.

During the recent war he suffered a sad bereavement in the loss of his wife and his home was badly damaged.

Of late his health had not been what it once was. He began to tire more easily. With his memories going back over so many years he noticed a change in the tempo of life. The younger officers, he noticed, were taking life more seriously than their lighter-hearted predecessors of forty years ago. He realized that "times do be changing" and felt that the time for quiet retirement had come.

Many of our retired officers who share with Pomfret memories of the Hotel Belgravia and St. Ermins will be glad to know that he is comfortably installed in a flat in the immediate vicinity of St. Georges Square where, surrounded by such of his possessions and souvenirs as have survived the war years, he is already enjoying the first of what we all hope will be many years of that peaceful retirement to which we all look forward.

He sends the following message to his old friends:

"On my retirement I wish to express my very sincere thanks to all officers of the Corps (past and present) for the many kindnesses I have received during my Service."

Obituary

Brigadier WILLIAM ANDERSON, *O.B.E.*, *F.R.C.S.*

It is with great regret that we record the death of Brigadier William Anderson, recently Consulting Surgeon to the Scottish Command and Northern Ireland.

The writer had the good fortune to serve with him in No. 32 C.C.S. at St. Venant in 1916. From time to time, when things were slack, we would pay a visit to Bethune where John Fraser was then operating. It was in this City that Willie, later, cemented what was to prove a life-long and very close friendship with Elliott Cutler whose children idolized him. They met fairly often at Millbank during the recent war. This was a friendship which did much to help the very close liaison between the Surgeons of the U.S.A. and our own.

During this last war—in addition to his normal duties as a Consulting Surgeon—he occasionally relieved the Consulting Surgeon to the Army and sat as a member of the War Office Medical Board. Here he gave sound advice and was still the same kindly soul that he had always been in his dealings with patients and colleagues.

Throughout his life he had never spared himself when there was anything that might be done for others. Even when he took a few hours relaxation on the moors of Aberdeenshire there was always a highly organized signal system to allow of his recall in the event of a surgical emergency.

Of him it might almost have been written:

"My candle burns at both ends,
It will not last the night.
But, Oh my foes and Ah my friends,
It gives a lovely light."

Willie had no foes—now that he has passed on we, who were his friends, miss one of the brightest of the Northern Lights.

No better can be said of him than that the world was a better place for his having been in it.

D. C. M. writes: The recent announcement of the death, at Aberdeen, on November 29 of Brigadier William Anderson, comes as a shock to his many friends and admirers in all walks of life and particularly to his contemporaries in the Corps. Connected with this sad event, there is rather more than the average element of tragedy. In the first place, it was so unexpected as he had been apparently in good health and his usual high spirits just prior to the occurrence. Again, it occurred with dramatic suddenness, while giving evidence in the witness box. Finally, he had recently purchased a new home, and had announced his intention to retire from active surgical practice in the near future, to enjoy a well-merited rest. A distinguished graduate of his Alma Mater, the Aberdeen medical school, he learned the basic elements of his art under distinguished surgical masters, such as Gray and Marnock. During World War I he served with the B.E.F. as a surgical specialist, and it was at this time, when we were operating at adjoining C.C.S.s, that the writer first had the privilege of meeting him. On the outbreak of World War II he was the obvious choice for Consultant Surgeon to Scottish Command and we met frequently at the monthly meetings of the W.O. Surgical Consultants Committee, of which I had the honour to be *ex-officio* chairman. I owe him much for his help, sound advice and co-operation and shall never forget his unfailing optimism and good humour. Gifted with more than the usual amount of that inestimable mixture of Scottish caniness and sound common sense, which I have always felt tends to characterize the more distinguished graduates of Scottish medical schools, his contributions to the discussions in the W.O. Committee were always listened to with great respect. Indeed, he was a man of great charm of manner with a generous, lovable and kindly disposition. It is not to be wondered at that in his native city and throughout the north of Scotland where he controlled an extensive surgical practice, he was regarded by his patients, rich and poor alike, as something in the nature of a father confessor, big uncle or fairy godfather. An Indian babu would have called him "the father and mother of the poor."

Our deepest sympathies go out to his widow and his family. As for us, while we, his friends and admirers, mourn the absence of "Willie Anderson of Aberdeen" from our midst, let us be grateful for the privilege of having known him, and be thankful that his passing was quick and clean and while he was still in harness and in full possession of his faculties.

J. M. W. writes: I first met William Anderson in the Mess at Millbank shortly after the return from Dunkirk and for the remainder of the War was closely associated with him.

At the monthly meetings of the Surgical Sub-Committee he was a tower of strength; full of common sense he was always ready to speak his mind and to maintain his opinion.

He was a delightful companion on tour when he was Consultant Surgeon to the Scottish and North of Ireland Commands.

He acted as Consultant Surgeon at the War Office when I went to North Africa and for some time we lived together in the Mess and got to know one another well.

I know that he regretted never having got overseas in the recent War.

He was a great gentleman and I never heard an unkind word said of him. He was always the same—steadfast and cheerful. After the War we corresponded regularly and he leaves an irreplaceable gap.

Lieut.-Col. FRANCIS JOSEPH BROWN, R.A.M.C. (Rtd.)

Lieutenant-Colonel Francis Joseph Brown died on November 20, 1949, in Roydon, Suffolk. He was born in Burton Bradstock, Dorset, on August 7, 1866. He qualified M.R.C.S.England, L.R.C.P.London, in 1888. He was commissioned Surgeon Captain July 28, 1891, and became Major, Royal Army Medical Corps on July 28, 1903. He retired on July 29, 1911, and was re-employed from August 5, 1914, to November 24, 1919. He received a Brevet-Lieutenant-Colonelcy on June 3, 1918.

He served in South Africa from 1899 to 1902 taking part in operations in Cape Colony and the Orange River Colony. (Queen's medal with two clasps: King's medal with two clasps.)

From 1915 to 1917 he served in Gallipoli as A.D.M.S., 52nd Lowland Division and also in Egypt and the Mediterranean.

From August to November 1919 he was on special recruiting duty in the United States and Canada.

Major-General SIR WILLIAM MICHAEL RUSSELL, K.C.M.G., C.B.

We regret to record the death of Sir William Russell in Crowborough on December 6, 1939, in his ninetieth year.

He took the L.S.A. in 1881 and the M.R.C.S. in 1882 and entered the Service as a surgeon in 1885. He rose to the rank of Colonel in 1914 and retired with the honorary rank of Major-General on December 26, 1917, but was retained on the active list until June 1919.

He had been D.A.D.G., A.M.S., from April 1903 to March 1908 and D.D.G., A.M.S., from October 1914 until his retirement.

He served in the Sudan with the Frontier Field Force in 1885, being present at the battle of Ginniss. He received the Medal and Bronze Star.

He again saw active service in the Zhob Valley in 1890 receiving the medal with clasp.

In the South African Campaign, 1899 - 1902, he took part in the advance on Kimberley and operations in the Transvaal and Cape Colony. Twice mentioned in despatches, he received the Brevet of Lieutenant-Colonel, the Queen's Medal with three clasps and the King's Medal with two clasps.

In the war of 1914 - 1921 he was mentioned in despatches, created *K.C.M.G.* and *C.B.* and awarded the General Service Medal.

Colonel PETER MacKESSACK, D.S.O., M.B., B.Sc.

In Bournemouth on December 9, 1949, Colonel Peter MacKessack. Born in Kinloss, Aberdeen, August 4, 1872, he took the B.Sc. Aberdeen, in 1892 and the M.B. Aberdeen, in 1896, and was appointed Surgeon Lieutenant July 28, 1897. Promoted Captain R.A.M.C. July 28, 1900, Major January 28, 1909, and Lieutenant-Colonel March 1, 1915, he retired with the rank of Colonel July 28, 1921. He took the D.P.H. Cambridge, in 1907. He served on the Nile in 1898, being awarded the Medal and Egyptian Medal. He was in France from August 1914 till March 1915, in Gallipoli from July to September 1915, and on the Macedonian Front from October 1915 till May 1919. Twice mentioned in despatches, he was awarded the D.S.O., the 1914 Star, British War and Victory Medals.

Correspondence

DEAR SIR,

In his paper entitled "Principles of Surgery in the Field; Including Transfusion" published in the September number of the *Journal*, Brigadier Fettes, in the second paragraph of the section on Transfusion (p. 113), argues that dried plasma is the best solution to the problem of blood transfusion in forward areas on active service.

In the conditions which will obtain in future wars this may well be the case and indeed, in certain campaigns in World War II, dried plasma was the only transfusion fluid which could be supplied to front-line units. Nevertheless I think it would be wrong to accept this as a principle which has universal application. At first sight it might have been assumed that the difficult conditions which prevailed in the Western Desert and later on the Western Front in Europe would make it impossible to provide whole blood for use in the forward areas. Yet, by the persistence and ingenuity of the Blood Transfusion Service, these difficulties were overcome. Blood was freely available throughout the Western Desert campaigns and was administered in the beach units on D-Day. "Delivery on the doorstep" was the slogan in Normandy, Belgium and Germany and rarely was this unfulfilled.

It is not my intention to enter into an argument on the respective merits of whole blood and plasma and I will merely record that, whatever the theoretical position may be, no doubt existed in the minds of surgeons and blood-transfusion officers in the forward area as to the superiority of whole blood over plasma.

While it is true, as Brigadier Fettes says, that reactions are more common with stored blood than with fresh, they were, in our experience, few and far between and the ill-effects they caused were many times outbalanced by the benefit derived from the blood.

My object in writing this letter is to emphasize the fact that whole blood can be supplied even under very difficult conditions and that every effort should be made to do so before deciding that plasma alone can be provided.

Yours faithfully,

J. S. K. Boyd.

*The Wellcome Laboratories
of Tropical Medicine.*

Notices

THE OFFICES OF THE JOURNAL

AFTER January 1, 1950, the Journal will be edited and managed from the Royal Army Medical College and it will be essential for changes of address, rank and decorations to be notified to the Manager as they occur.

Will all subscribers, therefore, whose rank, decorations or address require amendment complete the enclosed form?

The Manager,

Journal of the R.A.M.C.,

Royal Army Medical College,

Millbank,

London, S.W.1.

Kindly amend my particulars to read as follows:

Name, rank and decorations.....

Address

.....

Date..... Signature.....

Reviews

FITNESS FOR GAMES. By F. A. Hornibrook. London: Research Books Ltd. 1949. Pp. 39. Price 2s. 6d.

The author's intention in this pamphlet is to help adolescents who are keen on games and lack the advice of a trainer. The text and layout are appropriate to the intended readers. The advice offered is well tried and sound, although some of the specific treatments suggested are of doubtful value.

For the enthusiastic it is hardly full enough, but the average lad would benefit greatly if he could integrate his reading of the book with the practice of what he has read.

J. M. M.

FUNDAMENTAL CONSIDERATIONS IN ANÆSTHESIA. By Charles L. Burstein, M.D.
The Macmillan Company. 1949.

Here is a small book of great interest and value to the student of anæsthesia, in that it contains a simple, clear and concise account of certain fundamental physiological and pharmacological reactions, which are likely to confront the anæsthetist.

The application of such reactions to clinical anæsthesia is described with accuracy and detail, supported by excellent diagrams and tracings. It seems all the greater pity therefore that the complex pharmacology of curare, with its wide clinical application in these days, should be dismissed in a matter of little more than one page.

Dr. Burstein is to be congratulated upon making so difficult a subject appear relatively so simple, and this book is particularly recommended to the aspirant to a higher qualification in anæsthesia, who will be saved much vain searching through the larger textbooks of physiology and pharmacology.

K. F. S.

Extracts from the "London Gazette"

HONOURS AND AWARDS

(1) R.A.M.C.

The King has been graciously pleased to approve of the award of the British Empire Medal (Military Division) in recognition of gallant and distinguished services in Malaya during the period 1st January, 1949, to 30th June, 1949, to the undermentioned:

22224062 Sergeant Bernard Ambrose Scott, Royal Army Medical Corps.

(2) R.A.M.C. and Q.A.R.A.N.C.

The King has been graciously pleased that the following be Mentioned in recognition of gallant and distinguished services in Malaya during the period 1st January, 1949, to 30th June, 1949:

R.A.M.C. and late R.A.M.C.

Colonel A. E. Campbell, late R.A.M.C.

Colonel (temporary) R. S. Dickie.

Lieut.-Colonel W. A. Y. Knight.

Capt. G. B. Brown.

Capt. A. C. Milne.

Capt. J. C. Walker.

799602 War Subs/W.O. Class 1 W. J. R. Headley.

19174335 War Subs/Corporal R. C. Chard.

5184387 War Subs/Corporal S. Giddings.

19143058 War Subs/Corporal F. W. Smitton.

6345253 War Subs/Corporal J. H. Watts.

Queen Alexandra's Royal Army Nursing Corps

Senior/Commander J. Drennan.

Senior/Commander E. J. Stirling.

(3) *R.A.M.C. (T.A.) and R.A.D.C. (T.A.)*

(a) The King has been graciously pleased to confer "The Efficiency Decoration and First Clasp" upon the following officers of the Territorial Army:

Royal Army Medical Corps

Lieut.-Colonel A. G. Henderson.

Maj. W. B. Evans.

Maj. B. C. Jennings.

Maj. J. M. Macfie.

Lt. W. A. J. Davey.

(b) The King has been graciously pleased to confer "The Efficiency Decoration" upon the following officers of the Territorial Army:

Royal Army Medical Corps

Maj. F. H. Blackburn.

Maj. H. Bloom.

Maj. K. C. Hutchin.

Maj. L. W. Lauste.

Maj. A. E. K. Price.

Maj. F. J. G. Slater.

Maj. H. F. Whalley.

Royal Army Dental Corps

Capt. (Hon. Maj.) M. C. Hart.

Capt. G. H. Eaton-Smith.

Capt. G. G. Ellis.

PROMOTIONS

(1) *R.A.M.C. and late R.A.M.C.*

(a) To be Maj.-Gen.:

Brig. T. Young, *O.B.E.*, *M.B.* (supern.) 28.11.49

(b) To be Lt.-Col.:

Maj. G. C. Dansey-Browning 28.11.49

Maj. (WS/Lt.-Col.) J. D. Cruickshank 3.12.49

Maj. (WS/Lt.-Col.) A. B. Dempsey, *F.R.C.S.* 13.12.49

RETIREMENTS AND RESIGNATIONS

(1) *R.A.M.C. and late R.A.M.C.*

Maj.-Gen. J. C. A. Dowse, *C.B.*, *C.B.E.*, *M.C.*, *M.B.*, *K.H.P.* 26.12.49

Lt.-Col. P. Dwyer, *M.B.* (disability) 27.12.49

(2) *R.A.D.C.*

Capt. R. G. C. Dempster 2.12.49 (Hon. Capt.)

APPOINTMENTS TO SHORT SERVICE AND REGULAR COMMISSIONS

(1) *R.A.M.C.*

(a) From National Service List is apptd. to a short service commn. in the rank of Lieut.:

Lt. H. A. J. Reay (retaining present seniority) 23.11.49

(b) From Short Serv. (Specialist) Commn. is apptd. to a permanent commn. in the rank of Captain:

Capt. J. L. Huggan, M.B. (retaining present seniority) 29.8.49

(2) *R.A.D.C.*

From National Service List, to be Lt., with seniority 28th Sept., 1949:

Lt. R. Baines 24.11.49

RETENTION ON THE ACTIVE LIST SUPERNUMERARY TO ESTABLISHMENT

The undermentioned, having attained the age limit for retirement, are retained on the active list, supern. to establ.:

Maj.-Gen. J. C. A. Dowse, *C.B.*, *C.B.E.*, *M.C.*, *M.B.*, *K.H.P.* 28.11.49

Colonel G. O. F. Alley, *M.C.*, *M.D.* 3.12.49

SPECIAL APPOINTMENT

Brigadier J. M. Macfie, *C.B.E.*, *M.C.*, *M.B.*, late *R.A.M.C.*, is appointed Commandant and Director of Studies, Royal Army Medical College and is granted the temporary rank of Maj.-Gen. 28th Nov., 1949.

CORRIGENDA

Some Principles Involved in Tactical Employment of Forward Units, by Major-General J. C. A. Dowse in the October Number 1949.

Page 177, line 27, *should read* "decrease in the 'teeth' and other arms."

Page 183, last line, *delete* "not."

EDITORIAL NOTICES

The Editor will be glad to receive original communications upon professional subjects, travel, personal experiences, etc.

Correspondence on matters of interest to the Corps, and articles of a non-scientific character, may be accepted for publication under a *nom de plume*.

All Communications or Articles accepted and published in the "Journal of the Royal Army Medical Corps" will (unless the author notifies at the time of submission that he reserves the copyright of the article to himself) become the property of the Library and Journal Committee who will exercise full copyright powers concerning such Articles.

A free issue of twelve reprints will be made to contributors of Original Communications, and of twelve excerpts in the case of Lectures, Travels, Clinical and Other Notes. Such free reprints or excerpts will, however, owing to the shortage of paper, only be sent to those specifying their wish to have them, and a request for them should accompany the article when submitted for publication, the request being made in the form of a note at the foot of the manuscript.

Reprints or excerpts, additional to the above, can be furnished on payment if specially ordered at the time of submission of the article for publication.

Communications in regard to editorial business should be addressed—"The Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, A.M.D.2, War Office, London, S.W.1."

MANAGER'S NOTICES

The Annual Subscription for the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS is £1 payable in advance. Single copies, 2s. 6d. per copy.

Cheques, etc., should be made payable to the "Journal R.A.M.C.," and crossed "Holt & Co."

Communications in regard to subscriptions, change of address, etc., should be addressed "The Manager, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, A.M.D.1, War Office, London, S.W.1."

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EDITOR
COLONEL G. W. WILL, O.B.E.
MANAGER
MAJOR H. W. PECK, R.A.M.C.

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Journal **of the** **Royal Army Medical Corps.**

Editorial

OSBORNE HOUSE

KING EDWARD VII CONVALESCENT HOME FOR OFFICERS

OSBORNE HOUSE was for some forty years the private home of Queen Victoria.

After Her Majesty's death, however, King Edward VII, after consultation with his advisers, and with the concurrence of King George V, then the Prince of Wales, gave the Osborne Estate, including Osborne House, to the Nation. The State Apartments of Osborne House and the Swiss Cottage Museum and Garden were to be thrown open to the public, and the remaining portion of the House, except those apartments which had been in the personal occupation of Queen Victoria and which were to be kept closed, was to be utilized as a Convalescent Home for officers of the Fighting Forces.

And so it has remained ever since except that established Civil Servants serving at home and abroad, Officers of the Women's Forces and certain patients recommended by the Ministry of Pensions are now also eligible for admission.

Such admission is easily arranged. A letter to the House Governor brings an application form. This completed is returned together with a medical certificate and, if the patient be accepted, an admission date is given.

All modern forms of rehabilitation treatment under trained and experienced therapists are available—massage, electro-therapy, remedial exercises and the rest—all are carried out under the supervision of the House Governor. There is a remarkably tactful, persuasive and determined occupational therapist under whom manifold activities varying between scarf making and boat-building are carried out.

There is the best nine hole golf course on the Island and this year a hard tennis court is available. In the summer there are manifold outdoor activities.

There is a minimum of rules and restrictions, the main being an insistence on punctual attendance for treatment, punctuality at meals and no discussion of your own or anyone else's ailment.

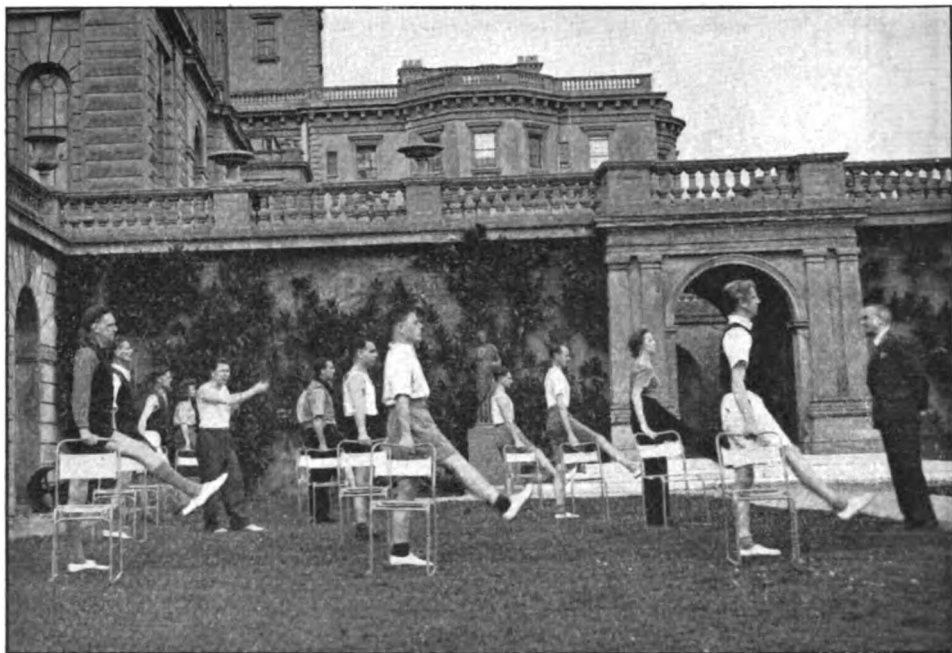


Photo by "Topical" Press Agency Ltd.

A physical exercise rehabilitation class under Mr. Lewis with Major-General Priest, the House Governor, looking on

On admission each patient is seen by the House Governor and the following morning has a complete and thorough overhaul and a course of treatment decided upon varying, it is needless to say, with the particular ailment or injury from which he has been suffering. Thereafter each patient is examined at a weekly interval to assess progress. There is further a panel of consultants who are available and who pay regular visits. Two local consultants can be called in in an emergency.

The atmosphere of Osborne calls for a certain degree of formality in regard to meals but it is really that of a not too strict Service Mess. There are a reading room for officers—formerly Her Majesty's Council Chamber; a small lounge for women officers; a library; a billiards room and a television viewing room. There is further a small hall where entertainments and cinema shows are held.

In short, Osborne is from every point of view an ideal place in which to convalesce and build up after an illness or injury. There is a unique mixture of the Services which is of great value to all.

When there recently we asked a little housemaid whether she ever saw any ghosts. "Ghosts!" she replied in a good Hampshire burr, "ghosts, there are no ghosts here. This is far too happy a place for ghosts."

Original Communications

THE CARE OF THE SOLDIER'S FAMILY¹

BY

Major D. D. MAITLAND
Royal Army Medical Corps

NOTE.—For the purposes of this paper the terms "Care" and "Army Social Services" are taken to include health, housing, education and voluntary effort, and the wide aspects of each of them.

The Officer's family and the complex questions of pay, allowances and pensions, subjects for separate study in themselves, are not covered in this survey.

INTRODUCTION

MUCH has been written about the soldier throughout the ages. But to trace the history of the soldier's family one has to dig deep into histories of campaigns, official records, regulations and orders. Even these, however, leave the reader much to infer. That soldiers would marry and have children was accepted as inevitable. But as to the conditions in which these wives and children lived and thrived, few commentators were moved to enquire. Somehow they survived. And it was only when these families became a nuisance and an impediment that the Army authorities took account of them.

Inadequate as the recorded history of the soldier's family may be, it is none the less clear that military families have been well cared for through the years and in a manner which has often compared well with the living standards of the contemporary civilian family. This is in part attributable to the character of the military family. Soldiers' families are a peculiar community—half civilian half soldier, outside the civil population yet part of it, self-supporting and self-helping, jealous of its rights, proud of its loyalties and traditions.

The evolution of the care of the military family into a comprehensive social service, operating wherever the Army is garrisoned, is also attributable in part to the efforts of the Army authorities, hesitant though they may have been in the beginning, and of the great military reformers. Selfless voluntary effort of the noblest kind within the Army has also contributed to this development.

The welfare of the military family has developed in spite of public indifference, and at times hostility to the armed services. As a race the

¹ A dissertation submitted to the Royal Institute of Public Health and Hygiene, November 1949.

British have a profound dislike of militarism. Trevelyan records that even in Tudor times "a strong feeling existed among the English against professional soldiers" and that in Victorian times the "respectable working classes continued to regard enlistment in the Army as a failure in life, if not of positive disgrace." Fortescue has observed that at the beginning of the present century there were some respectable wage-earning families which wept if one of their number "went for a soldier" and thought it a disgrace to themselves. There were occasions, however, when the exploits of the Army aroused enthusiasm of the nation—occasions which the reformers used to advantage—but this enthusiasm soon gave way to apathy and the Army once more became "licentious soldiery." "It's Tommy this and Tommy that and chuck him out the brute, but it's thank you Mr. Atkins when the guns begin to shoot."

For the most part, therefore, the public were indifferent to the special needs of the soldier's family and ignorant of the contribution it made to the morale of the soldier, to his well-being and to his respectability. The public knew nothing and were content to know nothing of the hardships and sacrifices suffered by wives and children "following the flag." And so the soldiers' families were turned away from the public. They sought refuge in close communities united by common interests, experiences and hardships. Strong loyalties and traditions grew up. They learned to look after themselves both at home and abroad. And in time they became justifiably proud of their achievements. From these beginnings have grown the Regimental Associations, the Widows' Funds, the Educational Endowments and the Services' own co-operative society—the Navy, Army and Air Force Institutes.

Because of this voluntary effort, and because the soldiers' families lived in readily supervised communities, it was not difficult for the Army authorities, when the time came, to introduce and execute their reforms. Thus the wives and children were able to derive early benefit from services which are known today as Maternity and Child Welfare, School Health Service, Education, Community Centres, Voluntary Associations, Assistance, Rehabilitation, etc., whereas it was some years before these services were applied effectively to the civil population. And in many of these spheres, the civil population profited by the experience gained from the soldier's family.

The advances which the improvement in the conditions of the soldier's family reflect took place against a steady change in the attitude of the public towards the soldier. It is outwith the scope of this paper to trace the history of the British Army and it need only be said that the soldier of today was once, in the words of Wellington, "the scum of the earth." From those days when the principal causes of enlistment were drink, unemployment and trouble with the laws of the land, from the days of the press gangs and of the private levies of the aristocracy, and from the days of the Militia and short-term engagements when wars were being waged; from the times of the reforms of the Duke of York, the establishment of the standing army and the reorganizations of Lord Cardwell, Lord Haldane and Mr. Hore-

Belisha; from these has grown the regular army of today which offers a specialized career. Nor is it appropriate in this paper to describe in detail the manner in which the conditions of the life of the soldier and his family were influenced by the social trends of the past one hundred and fifty years (but comparative references to these trends will be made from time to time), nor the influence of the occasions when the Army became a nation in arms. These influences must be acknowledged.

EARLY SIGNS OF OFFICIAL RECOGNITION OF THE SOLDIER'S FAMILY.
1800-1890

The term "family" was unknown in the Army of 1800. The concern of the State, if indeed it was concerned at all, was with its soldiers alone, and it is left to the imagination to conjure up the picture of the conditions of life of the early military families. References to wives and children are rare in the Orders and Regulations of the period under review. Those that do occur, however, show unmistakably the trend of events.

The soldier's family was supported on the meagre pittance that was left of the soldier's pay after the many stoppages that were enforced at the time had been deducted. Wives and children eked out an existence alongside their soldier husbands, billeting with them in alehouses, suffering the same hardships and privations, accompanying the troops or following in their wake as best they could. From the available accounts of the living conditions of soldiers, the lot of the families must have been a hard one. Their dogged perseverance in remaining with their husbands, however, soon gained for the wives and children recognition by the Army authorities. Their uncatered-for presence became an impediment to the military machine, raising problems for the commissariat and the transport authorities. Their indiscipline soon became a major nuisance and the Army authorities could no longer remain indifferent. The existence of the Army family had to be recognized.

Wives to Accompany Husbands Overseas. 1800.

Gradually the natural desire for husband and wife to be together was accepted and, while the soldier's attention was drawn to the great disadvantages and "inconveniences of improvident marriages," which Commanding Officers were to discourage, the Army authorities at length decided to accept responsibility for wives and children. It was assumed that families would accept the hazards of following the flag without murmur and that they would prove themselves useful in domestic ways to the armies on the march. Accordingly, in October 1800, the Duke of York, that great Army reformer, issued an Order permitting "a proportion of women, being the lawful wives of soldiers, on a scale of six women to one hundred men, to embark with the troops for overseas service." The hapless wives left behind were to be provided with a monetary grant for themselves and their children to enable them to return to their homes. Those who did not avail themselves of this privilege, presumably because they had no homes to go to, were to be regarded as vagrants.

Experiences of Soldiers' Wives at the Peninsular Wars.

The fate of those wives who were fortunate enough to accompany their husbands to the Iberian Peninsula is revealed in the many accounts of the Peninsular Wars. "The soldiers' wives," writes Oman, "were indeed an extraordinary community" (N.B. the use of the word "community")—as hard as nails, expert plunderers, furious partisans of the supreme excellence of their own battalion, much given to fighting. Many of them were widows twice or thrice over, for when a husband was killed and his wife was a capable and desirable person, she would receive half a dozen proposals before her husband was forty-eight hours in his grave." Rifleman Harris recalls "watching the newly-made widows of the Company huddling together for comfort on the battlefield, with the sky for a canopy and the turf for a pillow." On another occasion an officer of General Moore's staff, finding a dying woman at the roadside with a living infant at her frozen breasts, wrapped it up in his cloak and took it with him. Schaumann records an incident during the shambles of the retreat into Portugal. "Hunger, dysentery and fever had reduced men and horses"—and presumably the soldiers' families—"to bundles of bones and the soldiers' wives, usually decently clad and faithful to their husbands went around on starved donkeys offering themselves to anyone for half a loaf." During the advance to Ciudad Rodrigo, a stout Irishwoman of the 88th was delivered of a child by the wayside and continued the march with her newborn infant in her arms.

Strength Return of Women and Children, 1804, and Feeding of Soldier's Family at Public Expense. 1807.

In spite of the hardships it involved, the Duke of York's Order, was a step forward in the official recognition of the status of the soldier's family and one of the first signs of the acceptance of responsibility for it by the Army. At the same time, in order to gauge the enormity of the problem, a return was called for by the Adjutant-General's Branch "of all women and children being legal wives of soldiers." The evidence which this produced did not daunt the authorities, for, in 1807, the Army undertook the feeding of military families at public expense; "no stoppage of pay is required for provisions supplied to wives, widows and children of soldiers."

Duke of York's Reforms. Barracks. 1792.

Other reforms introduced by the Duke of York were no less significant. The old system which provided for the quartering of troops in alehouses under the terms of the Mutiny Act had always been deficient and was at last recognized as such. The building of barracks for troops was begun in 1792 and eventually over two hundred barracks were built despite the scandal of Delancey, the Barrack-Master-General. In the space of a few years, the British Army was imperceptibly transferred from quarters in alehouses to quarters in barracks.

Reorganization of the Medical Department. 1798.

The improvements in accommodation for the Army were followed in 1798 by the reorganization of the Medical Department and of the Chaplain's Department. Thanks to the Duke's efforts, the Army was thus provided with a finer medical service and a more comprehensive spiritual care, the benefits of both of which were felt indirectly by the soldier's family.

Troopship Conditions. 1811.

The conditions under which soldiers' wives travelled on troopships in 1811 were tolerable if crude. They rose at six in the morning in common with the men. The Married People, as they were called at the time, were "confined in regard to their berths, to one particular part of the ship set apart for their use." The partitions between their berths, which were usually blankets, were to be removed in the morning and cleared away for the day so as not to obstruct the circulation of air. They were "not to be intermixed with the single men." The status of "Married People," their desire to be together in privacy had been acknowledged.

Duke of Yorks Reforms. Schools. 1811.

The education of the soldier's child had been receiving consideration. Through the private liberality and voluntary exertions of officers, a regimental school was frequently to be found in Army units of the eighteenth century. In 1767 there appeared a model set of standing orders printed by an officer of the Queen's Royal Regiment, in which this paragraph stood: "A Serjeant or Corporal, whose sobriety, honesty and good conduct can be depended upon, and that is capable of teaching Writing, Reading and Arithmetic, is to be employed in the capacity of a schoolmaster, where soldiers' children are to be carefully instructed." It was in such a school that William Cobbett, as a serjeant-major, began to compile and teach his English Grammar. In the summer of 1811, the Duke of York suggested the establishment of a Government school in every regiment: and in November of that year he directed all commanding officers to establish schools for soldiers' children. A schoolmaster-serjeant was added to the establishment of each unit. Not only was the Army a pioneer in the establishment of children's day schools: at a time when new educational foundations were rare, it undertook its boarding schools, mainly for the orphan sons of soldiers, the Duke of York's Royal Military School having been established in 1803. Thus early provision of schools wherever the family might be garrisoned, and the acceptance of responsibility for the compulsory education of the soldiers' child became a fact, anticipating the legislation which was to follow Forster's Education Act of 1870.

After Waterloo, Parliament returned to its old railing against a standing army and allowed all the military forces to fall into decay. The Army was reduced to a shadow and the ballot for the Militia was suspended year after year. The nation's wartime enthusiasm for the Army was on the wane.

The reformer's heyday was over for the time being, and it was not till the Crimean War, which saw all the blunders of the eighteenth century repeated, that the nation began to think once again about reforms. This is not surprising because the nation had important domestic problems to claim its attention, and there were no foreign wars to consume men and money. The Industrial Revolution had changed the character of England. Country people flocked to the towns to work in the new factories.

Changes in the National Life. 1815-1890.

This increased and sudden urbanization created most serious sanitary problems. The houses were crowded together, damp, ill-lit, badly ventilated and grossly overcrowded. Conditions in factories and mines were no better. Dirt and disease, malnutrition and, sometimes, starvation prevailed and these horrible conditions were aggravated by the ever-increasing density of the population. The opportunity for the application to the whole nation of the knowledge of hygiene and of the prevention of disease, which the medical profession had acquired, had arrived. The country was fortunate in having to hand men capable of seizing this opportunity; men like Jeremy Bentham, Adam Smith and James Mill; Edwin Chadwick and Southwood Smith; Lord Shaftesbury, the Wesleys, Disraeli, Dickens, Charles Kingsley and Mrs. Gaskell. The conscience of Parliament was stirred. The Reform Bill was passed in 1832 and the Elizabethan Poor Law was amended two years later. Chadwick's work on the Poor Law Commission and his famous report of 1842 led to a chain of public health legislation culminating in the Public Health Acts of 1848 and 1875. In this hastily devised manner, the representatives of the people attempted to legislate into existence the New Humanity.

The Crimea Commission. 1852.

Reports reaching home of the appalling conditions and high mortality in the Crimean hospitals led to the despatch of the Crimea Commission in 1852. The Royal Commission which was formed as a result of its report recommended sweeping changes in the Army Medical Services. The Army Medical Corps was formed. Statistics as to the health of the soldier were prescribed and an entire code covering the soldier's life in health and sickness was devised and applied. Barracks at home and abroad were improved. The military town of Aldershot came into being.

Hospitals for Wives and Children. 1863.

The soldiers' wives and children were not forgotten and in 1863 female hospitals were established. Florence Nightingale, to whom the soldier's family is much indebted, states that "a small number of hospitals for sick wives and children of soldiers have been erected in this country, on account of the very defective accommodation in married soldiers' quarters rendering due care of the sick, especially cases of confinements, all but impossible." She describes

the hospitals as being in two departments, one for confinements and the other for general cases. Miss Nightingale also describes the female hospitals established for the soldier's family in India, which shows that provision for the wives and children had extended to overseas garrisons.

Married Quarters Roll. 1873.

Further advances in the recognition of the soldier's family by the Army authorities are noted in Queen's Regulations in 1873. The establishment of the Married Quarters Roll was a great step forward, for families on this Roll became the responsibility of the Army for quartering, feeding and medical care. These were valuable entitlements. Not all soldiers' families received this privilege however. All soldiers below the rank of serjeant who had completed seven years' service and who were in possession of at least one good conduct badge and who had, previous to their marriage, obtained their commanding officer's permission were eligible to have their names placed on the Married Quarters Roll. An additional and desirable qualification was that a credit balance of at least five shillings in the Regimental Savings Account should be shown by the applicant. Those families who did not qualify were "married off the strength," and officially were no responsibility of the Army. On humanitarian grounds, however, medical attendance was afforded them.

Acceptance of Medical Responsibility for Families. 1878.

At this time, too, the Medical Services accepted responsibility for the soldiers' families. According to the Army Medical Regulations for 1878, "hospitals for wives and children of soldiers are provided and equipped at certain stations by the special authority of the Secretary of State. A Medical Officer is specially appointed to their charge and provided with a staff of female attendants. Up-patients in the maternity wards will be required to assist in cleansing the wards and in attending their fellow-patients." Families of soldiers, which in this regulation are officially defined for the first time as "his wife, legitimate children and step-children under the age of fourteen years," on the Married Quarters Roll became eligible for admission and treatment in these hospitals at public expense. Those families, "married off the strength may be admitted on payment of charges," and unless circumstances were exceptional would not receive medical attendance in their own homes.

Sanitary Inspection of Married Quarters. 1873.

In 1873, the Medical Officer of the Regiment was required "to be particular in observing the married soldiers' quarters and is to report to the Commanding Officer if they are not kept in a proper state of cleanliness." This was later extended to include the homes of the soldiers' families married off the strength. Prior to embarkation on board ship, the families were to present themselves for medical observation—the beginnings of quarantine control.

Voluntary Nursing and Training of Midwives. 1873.

The same Regulation empowered the Medical Officer in charge of Families' Hospitals to give instruction to soldiers' wives desirous of becoming midwives and qualifying as Army Midwives and Sick Nurses. This was an enlightened step in the control and training of midwives, and the Sick Nurse was the forerunner of the Health Visitor.

Statistics of the Health of Families. 1873. Edmund Parkes. 1864.

Monthly and Annual Returns of admissions and deaths of women and children in Female Hospitals were now called for, thus providing the Army Medical Department with valuable statistical data on the morbidity and mortality rates of the soldier's family. This was the direct outcome of the work of Edmund Parkes, to whom Army health owes much. As professor of Military Hygiene at the Army Medical College, he devised and applied an entire code of statistics covering the soldier's life in health and sickness.

A concise picture of the responsibilities of the Army Medical Services in the care of the soldier's family is obtained from the records of Surgeon-Major Riordan. Writing in 1890, he says, "Women and Children when sick in barracks are treated in their quarters, unless suffering from an infectious disease. Those on the Married Quarters Roll may be granted medical comforts—wine, brandy, arrowroot, beef extracts, but no extra meat or milk. When there is no Female Hospital, a room may be set aside in the barracks as a non-dieted hospital for the treatment of families. Women are not entitled to claim medical attendance for confinements in their quarters," for they were encouraged to enter the female hospital for this event where they were entitled to free medical attention and care.

Beginning of Maternity and Child Welfare Service for the Soldier's Family. 1880.

By 1880, therefore, a simple maternity and child welfare service had been established in the Army. The principle that women should enter hospital before their confinement and not after was applied. Domiciliary midwifery virtually ceased in the Army from this time. While there were numerous Lying-In Hospitals at this time in England, the principle of admitting pregnant women to hospital before confinement had not been generally recognized. When one reads that Doctor J. W. Ballantyne in 1901 deplored the fact that there "was no hospital accommodation for cases of pregnancy" in England, and when one recalls that the foundation of the maternity and child welfare service in civil life was to follow the Midwives Act of 1902, the Notification of Births Act of 1907 and the Paddington Infant Welfare Centre, established in 1907, credit must be given to the enlightened policy of the Army in this sphere.

Education of the Soldier's Child. 1873.

Further developments had been taking place in the sphere of education. In 1846, a Royal Warrant announced the formation of the Corps of Army Schoolmasters, with the object of raising the status of the Army school-teachers and, in 1852, Army Schoolmistresses were authorized. In 1873, Queen's Regulations provided for the "instruction of Soldiers' Children in Trades." This Instruction was to be made available in regimental workshops, stables, etc., and the wishes of the parent in a choice of trade were to be taken into consideration. This was, in other words, apprenticeship.

FURTHER DEVELOPMENT OF THE CARE OF THE SOLDIER'S FAMILY.
1890-1911

By 1890, the soldier's family had been received into the care of the Army authorities. The next twenty years see steady progress in the spheres of housing, education, maternity and child welfare, nursing and hygiene for soldiers' wives and children. The growth of voluntary effort and the formation of the Royal Army Medical Corps are other landmarks.

Housing the Soldier's Family. 1894.

The improvement of the housing conditions of the soldier's family now became the concern of the Army authorities. An official memorandum on sanitary inspections in 1898 reveals that "great and progressive improvements were taking place" and that "they would add much to the maintenance of the cleanliness, self-respect and comfort of the families." New regulations for married quarters embodied:

- (a) quarters of different size to be allotted on seniority and size of family;
- (b) windows with sashes, to increase ventilation;
- (c) provision of a larder or food store;
- (d) provision of a slop sink;
- (e) provision of a fire-place in all bedrooms;
- (f) inclusion of water closets, as far as practicable, in each quarter;
- (g) paving and asphaltting of the ground in front of buildings to protect women and children against wet and damp.

The magnitude of the advance can be appreciated when the "self-respect and comfort of the families" is receiving attention. The morale value of care was beginning to be understood. In 1894, lecturing to the Royal Artillery Institution at Woolwich, Brigade Surgeon-Lieutenant-Colonel Evatt observed "The new regulations from the Quartermaster-General's Department about married quarters seem very reasonable and very just. The whole system of married quarters is an evolution. Formerly, the wife was not recognised at all: then she crept into the barrack room and slept there with a sheet or a blanket put across to screen her from the soldiers: then they gave up the barrack room to four or five families; from that into a single room built as married

quarters. Next year, when the families go into the new Brookhill married quarters, I think that the demands of the most exacting sanitarian will have been met for the time being."

Child Welfare. School Inspection. 1898.

Child welfare was progressing too. Recommendations were made for the setting aside of space for playgrounds for soldiers' children, with provision for shelter in inclement weather. School Inspections had been established for the purpose of checking on environmental conditions in schools and on the health of the school children. These measures were in advance of the times. A report of a school inspection in 1898 is revealing. "We inspected the Army School buildings and saw the children at drill and remark, *en passant*, that such exercises in the open as extension movements, etc., are calculated to have an excellent effect on their physique and in inculcating a systematic obedience to orders. We took this occasion for making numerous enquiries regarding the health of the children and the lighting, warming and ventilation of the building." Recommendations in the report included provision of iron drinking cups, numbered hat pegs, fixed basins in lavatories and the avoidance of cold passages and the paving of coarse and rough playgrounds.

Compulsory Education. 1892. Nursery Schools.

Compulsory education, by regular attendance of children of all married soldiers between the ages of four and fourteen was laid down in Queen's Regulations for 1892, and the onus of ensuring regular attendance was placed on Commanding Officers. Removal from the Married Quarters Roll and the loss of its privileges was the penalty imposed on parents failing to comply with this Regulation. Infant schools for three-year-olds were also provided. Where no garrison schools existed, civil schools were utilized at public expense. Parents could send their children to "an efficient civil school," if they desired, but they had to bear the cost themselves.

Formation of the Royal Army Medical Corps. 1898. Formation of Queen Alexandra's Imperial Military Nursing Service.

The Army Medical Services were reorganized. The Royal Army Medical Corps was formed and the status of the Army doctor was raised. The Royal Army Medical College became the seat of learning for Army specialists in medicine, surgery, pathology and hygiene. Obstetrics and gynaecology had their home at the Princess Margaret Louise Hospital at Aldershot, one of the finest maternity centres of its day. Two model hospitals were built at Netley and Woolwich. A new era was opening for the Army Medical Services. The reorganization of the Army Nursing Services followed and, in 1902, the Queen Alexandra's Imperial Military Nursing Service was formed, bringing to the soldier and his family, wherever they may be, nursing of the highest quality.

Voluntary Effort. S.S.A.F.A. 1885.

Voluntary effort within the Army was now well established. The formation of Regimental Associations had spread, providing links with soldiers past and present, maintaining tradition, fostering pride and morale. Their funds, raised by the troops themselves, brought assistance to ex-soldiers who had fallen on hard times, to widows and orphans of the regiment, supplementing the meagre pension granted by the State. Regimental Associations laid the foundations of reinstatement in civil life in finding employment for soldiers who had completed their service with the colours. The Soldiers', Sailors', and Airmen's Families Association was founded in 1885 with the object of bringing comfort to the homes and dependants of servicemen. This Association expanded during the years to the national organization it is today with a fine record of help and comfort to countless service families. In 1901 the Soldiers' and Sailors' Help Society was formed. Its objects were to provide employment for discharged soldiers, homes for aged and disabled ex-servicemen and for their training in useful trades. Thus the seeds of Rehabilitation were sown.

Boarding Schools for Soldiers' Orphans. 1885-1908.

The Army authorities now made further provision for the education of the destitute sons and orphans of soldiers. To the Duke of York's Royal Military School were added the Gordon Memorial Boys' Home and the Queen Victoria School at Dunblane in 1885 and 1908, respectively. These schools provided free boarding education from nine years to fourteen years and besides giving a first-class secondary education they fitted boys for entering the Services or industry.

School Medical Inspections. 1905.

The medical inspection of schools had advanced to the status of a Health Service, but no title was given to it as it was considered part of the ordinary duties of a Medical Officer in charge of Troops. The heights it had attained in 1905 can be assessed from an article written at that time by a Captain D. J. Collins. "Among the multifarious duties of a medical officer in charge of troops in quarters," he writes, "perhaps not the least important is the weekly inspection of the schools for soldiers' children in barracks or sanitary district under his charge. The chief object of this inspection is, no doubt, the early detection of infectious disease, in order that first cases may be isolated, arrangements made for disinfection and the infection, as it were, nipped in the bud. This periodical inspection often leads to the detection of scabies, tuberculosis, chorea, adenoids, errors of refraction, etc. In this respect the military community is in advance of the civil, in this country at least, where periodic medical inspections of schools has not yet been adopted." The paper goes on to advise inspecting medical officers on lighting of class-rooms, desks, and seating, postural problems, homework, recreation and play, printing in books and eye defects.

School Dental Care. 1905.

Care of the teeth of soldiers' children was receiving attention. Howe, writing in 1905, deplored the fact that "a large number of married men in the Army do not realize the importance of teaching their children to clean their teeth." As many of the boys subsequently entered the Service and some of the girls ultimately became the wives and mothers of Servicemen, he stressed the importance of the early acquirement of habits of dental hygiene, and the desirability of school children receiving regular dental treatment. He proposed education in dental hygiene in the shape of lectures to school children and to their parents.

School Milk. 1907.

Mid-morning milk was now being supplied to soldiers' children in Army schools. As these schools were in barracks and therefore adjacent to married quarters, school meals were not instituted in the Army. Moreover, Army rations were considered to be adequate, without supplement.

The Civil Background. 1890-1911.

At home a programme of social and political change was being carried out. Labour conflicts attained an intensity never before known. Trade Unions had been legalized. The Fabians and the Labour Party had appeared on the scene, bringing with them the "New Democracy." Important social and public health legislation passed through Parliament. The Midwives Act and the Notification of Births Act set the scene for the Maternity and Child Welfare Act which was to follow later. Balfour's Education Act, the provision of school meals and the medical inspection of school children laid the foundations of a school health service and a new deal for the school child. The work of Thackeray and Greenhow on behalf of factory workers led to legislation which improved the working conditions of the labouring classes. The work of the Webbs and their Minority Report was the first nail in the coffin of the Poor Law. In the public health world much had taken place. Simon built on the foundations laid by Chadwick. Medical knowledge had seen great advances. The new science of bacteriology produced a profound alteration in the prevention and treatment of disease. The work of Lister and Almroth Wright added to the growing knowledge. The National Health Insurance Act of 1911 was the first step in providing for the working classes what the soldier and his family had been privileged to receive for many years.

As has been seen the care of the Army family reflects these powerful influences. It may be true to say that the experiences of the social reforms in the Army had also given benefit to the nation. The Royal Army Medical Corps was fortunate in being able to apply the new-found medical knowledge to the organized and disciplined community under its care under widely varying conditions and, by their experience, to add to it to the advantage of the soldier, his wife and child.

THE PERIOD BETWEEN THE WARS. 1921-1939

The twentieth century, as has been seen, opened with a wide and soundly established measure of social care for the soldier's family. Under the impetus of the social trends of the day and the initiative of the Army authorities, the gain achieved continued to be consolidated. In 1921 no other community was in receipt of benefits which included free housing, feeding, education, travel and medical and dental care, supported by the right measure of voluntary effort and re-instatement in employment on completion of service.

Statistics. 1921. Hygiene Directorate at the War Office. 1921.

In 1921, vital statistics applying to soldiers' wives and children treated in hospital were shown separately for the first time in the Annual Report of the Health of the Army. At the same time a Hygiene Directorate was established in the Army Medical Department, the objects of which were:

(a) to stimulate and initiate research into the various problems which affect the physical efficiency of the troops, and to raise the standard of hygiene in the Army; and

(b) to ensure that the welfare and health of the troops were carefully watched by officers who had made a special study of the subject.

The Annual Report of the Health of the Army now contained information under the headings of Women and Children, Army Schools, Mother and Child Welfare, and year to year progress could now be followed with ease and clarity.

Mother and Child Welfare. 1921.

The organization of Mother and Child Welfare schemes in the larger garrisons and in many of the smaller ones was well advanced by 1921. Accommodation for these Centres was generally found in the Families Hospitals where these existed, or in the regimental canteens. These Centres were supplementary to the Ante- and Post-Natal Clinics which were held in the Families Hospitals. They were supported entirely by voluntary effort and subscription and were organized and administered by committees formed from amongst the wives of officers and men of the station under the guidance of the Medical Officers in charge of Families.

Barracks and Married Quarters. 1921-1924. Expansion of Families' Hospitals. 1924. Official Sanction of Mother and Child Welfare Centres. 1924-1931.

The situation with regard to barracks and married quarters was not so satisfactory. The war had interfered with the construction of new permanent barracks and hospitals and with the maintenance of existing ones. In consequence, much leeway had to be made up. Many temporary hutted camps and hospitals had been erected during the war. These were unfortunately to be occupied long after they had outlived their original purpose. By 1924, however, much improvement had taken place and new barracks were being

built to relieve the existing overcrowding. Increasing demands on the Families' Hospitals had necessitated reconstruction and expansion. In September 1924, official sanction was given by the Army to Mother and Child Welfare Centres and financial grants from Army funds and the provision of equipment were authorized. This represented official recognition of the fine work which these Centres, hitherto organized and financed by the Army community, had been doing and acceptance of the principle that "the future mental and physical state of the nation depends more on the proper supervision of the infant during the first five years of its life and of the child during its school life, than on any other measure which can be applied at a later date."

Voluntary Effort Continues.

The Centres still depended upon voluntary effort to some extent, however. Command Charities and the Soldiers', Sailors', and Airmen's Families' Association contributed funds and staff. The S.S.A.F.A. nurses, full-time trained nurses, became the link between the Centres and the Families' Hospitals and were, in effect, the Health Visitors of the Medical Officer in charge of Families. These nurses served soldiers' families in Egypt, Malta and China, as well as in most of the Home Commands. At home additional nursing assistance was given by the Victoria Nursing Association and the Carisbrooke Nursing Association. By 1931, fifty-six of these official Centres had been established at home; in addition there were thirteen unofficial Centres. Abroad there were sixteen official Centres.

Schools. 1924-1928.

School inspections continued to be carried out frequently and all pupils were examined. The standard of cleanliness, condition of clothing and general welfare was described as high in the Annual Report for 1924. By a Royal Warrant of 1928, the Army Schoolmistresses Department became the Corps of Queen's Army Schoolmistresses. Only by continuing to maintain garrison schools everywhere could the soldier's child, which moved with its father from place to place, be given anything approaching a planned school life. A standardized syllabus and the Army Book 81 (Child's Record Card) facilitated progressive education. A child's record book showing attendances at fourteen schools in eleven years was not uncommon. Spending more than half her service abroad, building up a picture of English life for children who were more familiar with foreign conditions, the Queen's Army Schoolmistress deserves commendation.

Army Hygiene Advisory Committee.

An Army Hygiene Advisory Committee was set up with wide terms of reference, including the improvement of married quarters.

Improvement in the co-operation between the Welfare Centres and the Families' Hospitals and their specialists had led to the achievement of a

high standard of results in maternity and child welfare. Maternal mortality in civil life at this time (1930) was 4.4 per thousand, while in military hospitals at home and abroad, excluding India, two deaths from 1849 parturitions were recorded.

Child Health.

The health and physical fitness of the soldier's child was also improving and with the development of Welfare Centres and their close co-operation with the Families' Hospitals and all specialists of the Royal Army Medical Corps, it was hoped that it would be the exception for a soldier's child to reach adolescence the victim of any preventable medical or physical defect.

Ante- and Post-Natal Clinics. 1936.

By 1936, the Ante- and Post-Natal Clinics at Military Families' Hospitals had reached a high standard. Ante-natal supervision was carried out by the Medical Officer who was to be in charge of the confinement and thus the divided responsibility, a disadvantage from which many civil clinics suffered, was avoided. The same Medical Officer was also responsible for the puerperium and thereafter he would see the mother and child under the care of the S.S.A.F.A. nurse at the Welfare Centre. No closer or more continuous liaison between medical care and the expectant and nursing mother could be achieved. As can be imagined, little difficulty was experienced in inducing mothers to attend the clinics and Welfare Centres. Where distance from the clinics and Centres was a handicap, voluntary funds covered travelling expenses.

Morale Value to the Soldier.

It was not only the soldier's family who reaped the benefit of this valuable service, but also the soldier himself. His home conditions were improved, trouble and expense were lessened. The soldier and his wife grew to trust and respect the military maternity and child welfare service.

Modern Barracks. 1937.

The reforms of Mr. Hore-Belisha, which improved the terms of service of the soldier and instituted the building of modern barracks of the Sandhurst Block type, were interrupted by the outbreak of the Second World War, but not before many of the most up-to-date barracks and married quarters had been built at home.

Travel.

Improved travelling conditions for families had been effected by the commissioning of two modern troopships of the "Dunera" class and the establishment of regulated tours had shortened overseas service. Much had been learned from experience of life in tropical climates over the years so

that the soldier's family suffered little discomfort. The practice of moving families to the hills during the hot weather in India had been established for many years.

Immunization.

The immunization and inoculation policy of the Army had long been in advance of anything in civil life, by virtue of the control and supervision it exercised over its members and of the migratory habits of its families. Research and experience in the enteric group of fevers, cholera, yellow fever, typhus, tetanus, plague and rabies had produced a wide range of inoculations available for the protection of soldiers and their families wherever they served. The recorded incidence of these diseases in soldiers' families speaks highly of the preventive and protective measures adopted by the Army for its families, and of the very large measure of co-operation on the part of the families.

Comprehensive Medical Service.

The Army now offered its families a comprehensive medical service. The full range of modern specialties were now available to soldiers' wives and children, with the ancillaries of the convalescent home, physiotherapy and rehabilitation. The Hygiene Directorate at the War Office played the part of the Public Health Department of civil life, for few aspects of the life of the soldier and his family did not come within its purview. The Hygiene Specialists in the Army held the civilian Diploma in Public Health. In scope and activity the Army Medical Services reached high peaks during the Second World War, worthy of the praise that they received.

THE POSITION TODAY. 1946-1949.

Wartime Expansion of Social Services.

The comprehensive nature of the Army's social services at the outbreak of the Second World War facilitated the work of those concerned with the tremendous expansion necessitated by the Army's becoming once again a nation in arms. The machinery was already there; but, powered by the new-found national enthusiasm for the Services, it overran itself in the scope and lavishness of wartime welfare. Many of the privileges now became rights and new measures were introduced and the personal nature of the Army's social services was submerged in the national generosity.

Maintaining Family Ties.

The multifarious wartime welfare and health services in the Army are too familiar to require enumeration. Mention of a few with a direct bearing on families may, however, be made. Compassionate Leave, DILFOR schemes whereby wives were brought to the bedsides of their dangerously ill husbands, airgraph letters, family radio programmes, the work of S.S.A.F.A. in reconciling

broken marriages, the hostels and camps for wives and children, all were signs of the endeavour to keep the family together. Family life was re-established in the armies of occupation—"Operation Union"—housing and education being provided so that husbands, wives and children could be together.

Morale.

The work of Army psychiatrists in the sphere of morale demonstrated the importance of family welfare and care in the well-being of the soldier and amply justified the measures adopted by the Army for its families in previous years.

The "New Life of the Soldier."

The "New Life of the Soldier" appeared as an Army policy—plans for improved housing, feeding, the provision of better hospitals and barracks—evidence again of the impetus given by a nation in arms to Army reform.

Change in Composition of Army Families.

The military family has undergone a significant change. Today it is composed largely of conscript wives and children. Many are unwilling members of the Army community. The wide dispersion of regular soldiers, the abolition of the Cardwell system, the placing in suspended animation of many regiments have tended to break up the close community of regular soldiers' families. Identity with the group is being lost. Housing shortages and frequent transfers have aggravated the situation.

Effect of Recent Social Security Legislation. Army's Loss of Responsibility for Education and School Health at Home. The Soldier's Child. Newling Committee.

The social security legislation of recent years has brought little to the soldier's family that it did not have before. Indeed it has tended to increase the loss of identity of soldiers' families with their community and with their trusted and well-tried schemes of care. At home the Army schools have been surrendered to the Local Education Authorities. The Queen's Army Schoolmistresses have been replaced by the Ministry of Education teacher. The soldier's child has passed from the care of the Medical Officer in charge of Families and the Royal Army Dental Corps into the hands of the Local Education Authority. Overseas, however, he will return to the Army's care. Control is divided and continuity is lost. The soldier's child is like no other child and is deserving of special care and understanding. He often lacks the all-important continuity of education. His schooling is received in schools the world over and he moves from one to the other in the wake of his father. If this is avoided, he suffers from long separations and lack of fatherly influence.

He has no established home. He has travelled widely. He may be the product of a mixed marriage. That he is a special child has been recognized by the Army in the provision of schools wherever the Army is garrisoned and of teachers with a knowledge and understanding of Service conditions, teachers who themselves were often soldiers' wives, owing loyalty and service to their own community. The transfer of responsibility for the soldier's child to the Local Education Authorities will not solve the problem. The deliberations of the Newling Committee on the problem of the soldier's child will be watched with interest.

Effects of the National Health Service Act. 1946.

The National Health Service Act of 1946 brought its own problems. The soldier's family had for generations been in receipt of free medical care, but many of the ancillaries were financed from voluntary funds. S.S.A.F.A. nursing could no longer be paid for in a "free medical service" and S.S.A.F.A. nurses were taken over by the War Office. The Welfare Centres with their large measure of voluntary support became Family Health Centres under the Army Medical Services and lost their direct personal link with the families of the garrison. Many soldiers' wives and children, being dispersed and not of the Army community now avail themselves of the National Health Service and it is but a step for the whole responsibility for Maternity and Child Welfare at home to pass from the Army Medical Services altogether to the Local Health Authorities.

CONCLUSION

The progress of care for the soldier's family over a period of a hundred and fifty years has been surveyed. From the days when it received scant attention its evolution to the comprehensive service that it is today has been traced. The influence of national trends on its development have been acknowledged. The contribution which the Army's experience in these spheres has made to the benefit of mankind have been outlined. The part played by the soldier's family itself and by voluntary effort have been described. The special factors involved—the close community under discipline and control, the loyalties, traditions and common interests of the soldier's family—and their important contribution to the success of reform have been taken into consideration.

Before leaving the subject it may be of interest to consider the lessons of the past as we face the future. The soldier's family is a special community, it derives its morale from its traditions and its pride in being a close self-supporting community. Its needs are peculiar and cannot be met from an impersonal Welfare State. Caution must therefore be exercised lest the bonds binding the soldiers' families together be severed. The building of married quarters, the reduction of frequent unsettling transfers to a minimum and the maintenance of the Army Medical Services' continuous responsibility at home and abroad must be fundamentals in future planning. The special problem of the

soldier's child had been appreciated by the Army authorities. Brief periods in Local Education Authority schools, which are already overcrowded, under teachers unfamiliar with Service background, leaves the problem unsolved. The problem of the soldier's handicapped child must now receive attention and ascertainment of these children in Army schools abroad will have to be undertaken by the Army authorities.

The role of voluntary effort in the past has been a worthy one. The efforts of the Army community in this sphere must not be allowed to be submerged in the surge of the Welfare State, where it is now being found that voluntary effort still has a part to play. Voluntary effort in the Army should be fostered so that it will continue in the spirit in which it began.

Whatever the future may hold for the soldier's family, the past record of the Army authorities' deep concern for its welfare leaves little doubt that its best interests will be served.

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“ONE SHOT” TREATMENT OF VENEREAL DISEASES EMPLOYING PROCAINE PENICILLIN G WITH ALU- MINIUM MONOSTEARATE (P.A.M.)

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EVER since the discovery that penicillin was effective against syphilis efforts have been directed to the limitation of the number of injections to be given by the evolution of preparations which are either more slowly absorbed or more slowly excreted. The slow absorption methods gained the initiative with the introduction in 1945 of penicillin in oil beeswax (Romansky and Rittman) and the success of delayed excretion procedures, employing caronamide, came only after the delayed absorption techniques had become established arriving too late to enjoy general use.

Penicillin in oil beeswax, however, proved by no means always easy to administer, especially in the hands of the general practitioner remote from the surgery or clinic. The discovery that procaine combined with penicillin in equimolecular amounts to form a crystalline salt procaine penicillin which, if injected in watery or an oily medium, will give blood levels of penicillin comparable with those obtained with penicillin in oil beeswax (Herrell *et al.*) was heralded as a major advance.

Procaine penicillin was improved still further by the addition of a water-repellent substance aluminium monostearate, after a single intramuscular injection of 600,000 units, of which detectable penicillin can be found in the blood for three to four days, while after a single dose of 2.0 or 2.4 million units for as long as a week or more (Young *et al.*).

The “single shot” treatment of gonorrhœa, first with penicillin in oil beeswax and then with procaine penicillin plain, has been established for a long time. Procaine penicillin with aluminium monostearate has proved no less successful although, with the more prolonged penicillin blood levels obtained with its use, there is a greater theoretical possibility of masking a concomitant incubating syphilitic infection and, for this reason and also on the grounds of economy,

some clinics have therefore reduced the dose given for gonorrhœa to 100,000 or 200,000 units which, in spite of the lower peak levels obtained, is apparently giving satisfactory clinical results.

Of greater interest, however, has been its use for early syphilis and it appears probable that Ehrlich's dream of curing the disease with one injection has at last been realized. Thomas *et al.* (1949a), employing four schedules consisting of single injections of 1·2 or 2·4 mega units of P.A.M., or divided injections of 1·2 mega units given weekly for two or four weeks, treated 30 cases of early syphilis with promising initial results. By the time that the same writers had treated 143 patients 113 were considered as showing satisfactory response (Kitchen *et al.*). Now Thomas *et al.* (1949b) report 160 cases so treated and after nine months 19 have been lost to observation, 17 still have insufficient follow up but 41 show serologic "cure" and 80 show serological improvement while there have been so far only three failures. Likewise Taggart *et al.* (1949) treated 97 patients with early syphilis by the "single shot" method but only 25 (7 of which were sero-negative primaries) were observed for six months and 2 required retreatment one of which was a probable reinfection.

We can but await the outcome of this American work before reaching any definite conclusion but the preliminary observations are most encouraging. The type of work for which such treatment, if successful, would be the most applicable is the mass treatment of native populations where ordinary medical facilities are minimal and it would be especially welcomed in tropical and subtropical Africa.

The present paper is written on experience gained during a Venereal Diseases Survey of the African in Southern Rhodesia undertaken during 1949 (Willcox). It was considered desirable to give P.A.M. to in-patients of a Native Venereal Diseases Hospital and compare the initial results with those of other tried methods. Here there was an abundance of clinical material but the opportunities for follow-up were minimal as the African does not usually attend for such matters once the sores have healed. (Of 415 persons instructed to attend for monthly post-treatment blood tests at this hospital, for example, only 64 returned at the end of the first month.) Hence the data presented is concerned solely with the immediate results.

Some 114 venereal diseases patients were given single intramuscular injection of 2·4 mega units of procaine penicillin with 2 per cent aluminium monostearate (Boots) and 17 others received the same dose to assess its prophylactic value against an experimental infection with soft sore.

Penicillin Serum Levels.—Tests were made for the presence of penicillin on 80 sera from 40 patients at varying intervals after injection. Penicillin was found in all of 5 patients tested on the ninth day, all of 10 tested on the eighth day, all of 12 on the seventh day, all of 12 on the sixth day, all of 10 at the fifth day, all of 10 at the fourth day, all of 7 at the third day, all of 8 on the second day and all of 6 tested one day after receiving the injection.

The Patients.—The cases treated were as follows:

<i>Type of case</i>								<i>No.</i>
Dark field positive early syphilis	...	...	...	...	...	...	...	30
Dark field negative sero-positive clinical early syphilis	...	...	...	...	...	...	...	22
Dark field negative sero-negative clinical early syphilis	...	...	...	...	...	...	...	23
Dark field negative clinical early syphilis without blood test	...	...	...	...	...	...	...	5
Soft sore	...	...	...	...	...	...	...	19
Lymphogranuloma venereum	...	...	...	...	...	...	...	4
Gonococcal epididymo-orchitis	...	...	...	...	...	...	...	2
Others	...	...	...	...	...	...	...	9

114

Dark Field Positive Early Syphilis (30 Cases).—This group includes 20 cases of primary syphilis and 10 cases of secondary syphilis. Of the primary cases 9 were sero-negative and eleven sero-positive. In all *T. pallidum* was found in the dark field before treatment. Of 26 patients 15 had had their lesions for under two weeks and 11 over that time. The last admitted sexual contact was under a month previously in 20 and over a month in 10. All but one had made some form of financial payment, it being the customary 2s. 6d. "short time" in 16, and 5s. all night in 9 while in 5 others the money paid ranged from 1s. 6d. to a pre-lobola fee of £3. 3 of the patients had co-existent gonorrhœa. All of the patients were given single intramuscular injections of 2·4 mega units of P.A.M. and in all the dark field had become negative in twenty-four hours and the urethral discharges of the 3 affected rapidly cleared.

The average number of days before the sore had healed and the patient was discharged from hospital was 6·36 days (longest 14). 3 patients required additional treatment before the sore would heal, 2 with oral sulphadiazine and 1 with local calomel ointment. As with other rapid treatments with aureomycin and chloromycetin it was noted that cases of florid secondary syphilis apparently responded more quickly than those of primary syphilis (Willcox, 1949*b*). The average healing time for the 9 secondary cases was 5·5 days as against 6·8 days for the primary cases.

Dark Field Negative Sero-positive Early Syphilis (22 Cases).—These patients all had clinical syphilis as evidenced by the presence of classical syphilitic inguinal adenitis. Repeated dark fields of material from the sores, however, failed to show *T. pallidum* often on account of secondary infection or phimosis (of 310 consecutive admissions to this V.D. Hospital only 10 were circumcised). Gland punctures were not done in this series. In all, however, the serum tests for syphilis were positive. One patient had an additional gonococcal infection and in at least 3 cases, as evidenced by the presence of fluctuant buboes, there was thought to be a superadded chancroidal infection. Such was very common in this area.

Fifteen of 16 of the patients had had their condition for under two weeks. 20 had had their last sexual contact at periods under a month and only 2 longer than this time. 14 paid 2s. 6d. "short time," 4 gave 5s. for the night while 1 paid only 1s. 6d. and 3 paid nothing at all. All patients received single

injections of 2·4 mega units of P.A.M. and the average number of days before the sores were healed was 8·27 (longest 18). 4 of the patients, 2 of which were those suspected of having a superadded soft sore infection, were given oral sulphadiazine, 1 with penicillin in addition, and 2 others were given local calomel ointment. In this group also the three secondary cases (average 4·66 days) healed more quickly than those of primary syphilis. The case of gonorrhœa responded rapidly.

Dark Field Negative Sero-negative Clinical Early Syphilis (23 Cases).—This group of 23 patients had clinical primary syphilis, as evidenced by the sore and typical syphilitic inguinal glands, but no *T. pallidum* was found in two daily dark fields and the serum tests for syphilis were also negative. One patient had co-existent gonorrhœa. It is considered likely that some cases of chancroid were unwittingly included in this group and 1 case was definitely believed to have a double infection. Only 2 of 14 patients had had their lesions longer than two weeks. Of 22 noted the last contact had been less than a month in 20. 5 denied having paid any money; 12 gave the traditional 2s. 6d. for a brief liaison and 3 gave 5s. for the night. 2 others paid 1s. 6d. and £1 respectively.

All were given single intramuscular injections of 2·4 mega units of P.A.M. and the lesions healed in an average of 6·45 days (longest 13). 2 cases required additional treatment (1 with sulphadiazine and 1 with local calomel ointment) while 2 others received systemic penicillin for other reasons, 1 with sulphadiazine in addition. Of 5 other early syphilitics treated, 3 with primary and 2 with secondary syphilis, in whom there were negative dark fields but no record as to serology, the average period before healing of the sores was 5·8 days. 1 required additional treatment with oral sulphadiazine.

Soft Sore: Clinical Infection (19 Cases).—9 cases of clinical soft sore were also treated. The majority had typical multiple sore and 7 had fluctuant tender buboes. Repeated daily dark field examinations were negative in all. The serum tests for syphilis were negative in 15 but positive in 4 persons who were believed to be latent syphilitics with superadded chancroid.

Eight of 9 questioned had had the infection for under seven days and 1 over this time. The most recent sexual intercourse admitted had been under two weeks in 13 and over two weeks in 6. 17 had paid 2s. 6d. for this, 1 gave 5s. and 1 no payment. All were given one injection of 2·4 mega units of P.A.M. and the patients were ready for discharge in an average of 5·5 days (longest 13); buboes being aspirated as required. 3 were regarded as failures and required additional treatment with oral sulphadiazine.

Under ordinary European conditions penicillin is not a satisfactory drug for soft sore as its very use implies at least a two-year follow up as for syphilis in case the infection was in reality syphilitic. Penicillin, therefore, has never been recommended for this condition and is seldom used and indeed, on the basis of laboratory tests, has not been considered as particularly effective. Reports from persons treating patients in the tropics, however, have indicated that it may have a beneficial action in man. For example Lahiri (1947)

reported 32 cases of chancroidal bulbo successfully treated with penicillin in India and Pereyra (1948), also apparently with success, gave penicillin by local iontophoresis to 13 patients.

The objections to its use, if the treatment proves effective, cease to be valid in those countries where a proper follow up of treated patients is not possible provided the same treatment is given for soft sore as that currently employed for syphilis. Hence, should the "one shot" treatment be proved effective for syphilis, if it is likewise effective for soft sore its general use for all cases of penile sore would become not only the most expedient method administratively but also medically desirable. The efficacy of the "one shot" penicillin treatment was, therefore, also tested in the experimental infection.

Soft Sore: Experimental Infection.—If a minute amount (0.05 c.c.) of pus from a chancroidal bubo is injected intradermally into the forearm of the patient himself, or into other volunteers, a small pustule will form at the site of injection in two to three days which, unless treated, progresses into a chancroidal



ulcer (*see fig.*). If the lesion is needled when in the pustular stage, and the patient treated with curative drugs of which penicillin was found to be one, the ulcer stage may be avoided.

On the other hand if drugs curative for soft sore are given to the recipient at the time of inoculation of the bubo fluid, or to the donor at least twenty-four hours before aspiration of the bubo, no such reactions will be observed in the recipients. Thus the relative value of curative agents may be compared.

Five series of such experiments performing single injections of P.A.M. were performed. The donors all had fluctuant buboes with typical penile soft sores, repeated dark fields of which were negative. The serum tests for syphilis were likewise negative but the Dmelcos skin tests were positive. Although organisms resembling Ducrey's bacilli could be demonstrated in scrapings from the penile sores they were not seen either in the bubo pus or in smears taken from aspirated arm pustules.

(a) *Treating the Donor.*—A man with a chancroidal bubo received a single injection of 2.4 mega units of P.A.M. and six days later 0.05 c.c. of the by then milky bubo fluid was injected intradermally into the patient himself and 2 volunteers. Neither of the volunteers showed any reaction although a pustule formed on the arm of the donor which was successfully treated with oral sulphadiazine and a more concentrated penicillin course.

(b) *Treating Recipients at the Time of Inoculation.*—0.05 c.c. of bubo fluid from an untreated donor, which invoked a local reaction in 2 of 3 untreated volunteers injected, was also injected into the arms of 7 persons who had received single injections of 2.4 mega units of P.A.M. from one to eight days previously (the intervals between the P.A.M. injection and inoculation being one, four, four, five, seven, seven and eight days respectively). There were no less than 5 "takes" in these persons the only 2 unaffected had received P.A.M. one day and seven days before.

The same amount of bubo fluid from another untreated donor, which produced a "take" on himself and on one other volunteer control, was injected intradermally into 8 others who had been given single injections of 2.4 mega units P.A.M. one to eight days previously (the actual intervals being one, two, three, four, six, seven, seven and eight days respectively). In this group there were only 3 "takes" in those who had been given P.A.M. seven, seven and eight days prior to inoculation. All those recently injected were unaffected.

Bubo fluid from yet another untreated donor, which produced a "take" on himself and 2 controls, was injected intradermally into 1 volunteer who received a simultaneous injection of 2.4 mega units of P.A.M. No reaction followed.

It will be noted of the volunteers in the last three experiments that 8 had received the P.A.M. one to four days prior to inoculation and 8 between five and eight days. Only 2 "takes" occurred in the first group and no less than 6 in the second.

It thus appears that penicillin certainly has some action upon a chancroidal infection in man but that the small amount of penicillin present in the blood four days after a single injection of 2.4 mega units of P.A.M. while sufficient for syphilis is insufficient to check an incubating soft sore infection. That such is probably the case is indicated by a further experiment in which a more sustained penicillin regime was used with complete success. The fluid from an untreated donor was injected into himself and into 2 controls with a "take" on all. It was then injected into 19 volunteers 2 of which were treated with

streptomycin, 4 with aureomycin, 4 with sulphathiazole and 9 with eight daily injections of 600,000 units of penicillin in oil beeswax with a "take" on none. It is therefore concluded that a single injection of 2.4 mega units of P.A.M. has a definite action upon soft sore although a cure is not as certain than if a traditional eight-day course is given.

Lymphogranuloma Venereum.—Whether or not penicillin has some action upon this disease is another matter which has given rise to a difference of opinion. Certainly in the past penicillin has not been recommended as it is liable to mark syphilis. However, now that aureomycin has been found to be effective in lymphogranuloma venereum (Wright *et al.*, 1948) (one case was successfully treated in Southern Rhodesia), and now that aureomycin has been found to be strongly spirochaetocidal and able to heal the lesions of early syphilis (O'Leary *et al.*, 1948; Willcox, 1949c) it is evident that this objection is being ignored.

Several years ago, when serving in West Africa, the writer treated 25 Gold Coast Africans and 2 Europeans with climatic bubo with what today would be regarded as small doses of penicillin. 17 cleared up without further therapy (Willcox, 1946). The type of lymphogranuloma venereum seen in Southern Rhodesia, where it is not so prevalent as in West Africa, is principally in the form of climatic bubo of males. 4 such cases, all mild and in all of whom the serum tests for syphilis were negative, were treated with single injections of 2.4 mega units of P.A.M. In none were the buboes fluctuant before treatment. One proceeded to fluctuation and was aspirated but all were discharged from hospital in an average of seven days.

Other Disorders.—2 cases of epididymo-orchitis associated with a purulent urethral discharge in which gonococci were found in the smears responded excellently to a single injection of 2.4 mega units of P.A.M. being ready for discharge in a painless state four and five days respectively after treatment. A third case of epididymo-orchitis also with a purulent urethral discharge but in which no gonococci could be seen in the smear was also treated but did not respond. Bilharzia ova were not able to be demonstrated in the urine of this patient.

Good results were also obtained with a case of scrotal abscess which, after evacuation of pus, healed in twelve days and also in 3 cases of septic scabies. 1 of balanitis and 1 of septic penile abrasion. 1 case of hydrocele and 1 of penile warts, not surprisingly, did not respond.

It is concluded that single injections of P.A.M. will initially benefit most venereal conditions with the exception of granuloma inguinale and non-specific urethritis which respond to streptomycin, aureomycin and chloromycetin.

SUMMARY AND CONCLUSIONS

- (1) The "single shot" treatment of gonorrhœa is well established.
- (2) The "single shot" treatment of syphilis is undergoing trial in the U.S.A. and the preliminary reports are very promising.

(3) If such a treatment can produce a success of only 70 per cent, and all the evidence points to a better anticipated result than this, then it will have the greatest application in the mass treatment of native populations where the follow up of individual cases has of necessity to be ignored.

(4) If it proves a success the nature of the immediate results to be expected in Bantu natives under short-term observation are indicated in this paper. "Single" injections of 2.4 mega units of P.A.M. were given in all cases, 4 c.c. into each buttock.

(5) 30 cases of early syphilis proved by dark field had their sores healed on an average of 6.36 days after treatment. 3 required additional measures which were given for other reasons to a 4th.

(6) 22 cases of clinical early syphilis with a positive serology, but in which the dark fields were negative, were likewise treated and the sores healed in an average of 8.27 days. 6 required additional treatment.

(7) 23 patients, in whom the dark fields were negative and also had a negative serology, and 5 others in whom the dark field was also negative without record of their serology, received similar treatment and were discharged in an average of 6.2 days. 3 required additional treatment and it was given to 2 others for other reasons.

(8) 19 cases of soft sore were also treated healing in an average of 5.6 days, other treatment being necessary in 3.

(9) Its effects in preventing an experimental infection of soft sore in humans was also tested. It was successful in doing so in 6 out of 8 persons inoculated one to four days after receiving an injection and in only 2 out of 8 inoculated five to eight days after. The bubo fluid of a patient treated six days previously was still virulent to himself but not to 2 others.

(10) P.A.M. was also successful in 4 cases of mild climatic bubo, 2 of gonococcal epididymo-orchitis, 3 of septic scabies and 1 of scrotal abscess and certain other conditions.

(11) The average in-patient time for the 114 venereal diseases patients was 6.6 days. 12 of 80 early syphilitics were given additional treatment.

(12) If, as a result of the American work at present in progress, the "single shot" treatment of syphilis achieves its present expectations this method will be of inestimable value in treating venereal diseases in native populations especially in those places where a doctor can visit only once a week or less often and diagnostic facilities are minimal.

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THE TRAINING OF FIELD MEDICAL UNITS

BY

Colonel F. M. RICHARDSON, *D.S.O., O.B.E., M.D.*

Late Royal Army Medical Corps

(continued from page 95)

TRAINING PROGRAMMES

The production of a good Training Programme is not merely a method of appeasing higher authority and of enabling administrative officers to keep an eye on the activities of units, but it is essential if the best use is to be made of any period of training.

THE TIME FACTOR

The total time available for Training may vary from a short break in operations to some years. It is convenient to plan Training Programmes in three-month periods. In the old Field Ambulance with two Companies and a Headquarters Company it may have been convenient for the C.O. to give to Company Commanders a syllabus of the training to be done in each three-month period and to let them work out their programmes in detail. With the modern Field Ambulance one unit Training Programme will probably be preferable. The unit may be divided into Training Groups.

The working period is the yardstick by which the Training day is measured. The most convenient period is one hour which should include the necessary short break. The mid-morning break may be staggered so that different groups have different times of attendance, e.g. those at 1000 hours break at 0950 and fall in again at 1010, etc.

For *the working day* eight hours is usually enough, and breakfast and billet fatigues should be finished before the Training Day begins. Routine daily inspections by Company Commanders, etc., should be completed before the clock hour to avoid interference with a training period. The suggested hours are morning 8 a.m. to 12, lunch 12 to 1 p.m., and afternoon 1 to 5 p.m. or 1.30 to 5.30 p.m.

The working week consists of five days, i.e. 40 hours, as Sundays and Saturday afternoons should be free, and one whole afternoon a week should be given to organized games. If the month is taken as consisting of 28 days the spare days can be used for revision or for any periods which have been unavoidably missed.

Total time available in three months is therefore twelve weeks, sixty days, or 480 hours.

General considerations: Lectures immediately after lunch should be avoided since even on the somewhat meagre ration now offered to the soldier most of

the audience tend to fall asleep. The weekly organized games should aim at getting every man to play some sort of game. Unit teams and other enthusiasts will play games in their spare time. Men who consistently dodge games may be put on guard, etc., on the weekly games afternoon. Fatigues, guards and other duties connected with the unit's interior economy are apt to play havoc with the Training Programme, and the Quartermaster and Regimental Serjeant Major especially must be watched in this connexion. Proper guards are only needed at night and Regimental Police are usually sufficient by day, though in some circumstances billet orderlies may also have to be used.

If members of guards and fire pickets have had the opportunity to get eight hours' sleep between mounting and dismounting they should not be allowed off any parades on the following day. Defaulters can get through a lot of work in off-duty times if properly supervised, but it may sometimes be better to employ a whole Section or Training Group at a time on necessary camp or billet fatigues.

PERSONNEL FACTORS

A new C.O. must study the present state of unit and individual training, and should avoid making sweeping changes in the methods of training, at least at the outset. It is best not to interfere with the training of such men as cooks and clerks except to include them in certain essential training. When new trainees are posted to the cookhouse or office the serjeant cook or the chief clerk should be asked to outline their intended scheme of training. The Quartermaster and Regimental Serjeant Major usually have enough clerical experience to be able to help in the supervision of clerks' training. Cooks can attend A.C.C. courses, and are in any case daily practising their specialty so that they should not become rusty.

Ideally, only men who have had a full course of Field Ambulance Training should be posted to specialist departments.

The types of employment suitable for the more or less untrainable men have been discussed, and for most of such jobs they should have some preliminary training, e.g. Regimental Police, Dining Room orderlies and Cooks' Assistants, Officers' orderlies and Mess orderlies, etc. The C.O. must ensure that specialists are given opportunities to pass trade tests and to qualify for advancement in their trade, and also that they are physically fit and able to march when necessary. A separate P.T. class may be necessary for them, and a serjeant may be put in charge of all employed men and specialists to ensure that they do not evade P.T. and other essential training. When untrained reinforcements join the unit it is best to wait until there are enough of them to form a separate cadre with its own programme. If the future role of the unit does not call for intensive training it may be wise to set the standard of training during the first three months at the level of men of limited capacities, and during these months to separate them into the more and the less intelligent groups. For those who have proved to be above the average a more advanced programme can then be devised, and from them

will be chosen the nursing orderlies, understudies for various specialists, and the potential N.C.O.s.

In order that the R.A.S.C. members of the unit can be given instruction in certain Field Ambulance subjects without undue interference with their normal duties they may be split into two or more groups and be attached to R.A.M.C. Training Groups for the necessary non-technical training.

The unit will tend for training purposes to fall into four categories: (i) The Stretcher bearers as the solid core; (ii) the employed men and specialists; (iii) the dullards, new untrained recruits, and men who have missed training owing to illness, detachment from the unit, or premature specialization; (iv) the most intelligent men, who can be further subdivided into potential N.C.O.s, a cadre for higher nursing training, etc.

Division into Training Groups and into various cadres may tend to cause men to lose sight of the normal organization of the unit, and of the sub-unit in which they will serve in action. This tendency can be corrected by having the normal organization of the unit permanently displayed on a notice board, and of course by using that organization on all exercises. The extent to which subjects will be taught by officers or by N.C.O.s will depend to some extent on their capabilities. Obviously some instruction should be given direct by officers, but on the whole N.C.O.s are the instructing element, and relay to their men the instruction which they have received from the officers, who may each have some specific subject allotted to them by the C.O.

SUBJECTS TO BE TAUGHT

These will vary with the future theatre of operations, and the unit's tactical role, the time available for training, and the present state of the unit's training. Each subject should be classified as:

(i) Common to the whole unit, e.g. Physical Fitness, Foot Drill, Anti-Gas Training, knowledge of Order of Battle and Deployment of the Division, and Tactical Exercises.

(ii) Common to the bulk of the unit, i.e. the Stretcher Bearers—e.g. Map Reading, Stretcher Carrying, Fieldcraft and Visual Training, Pannier Drill, etc.

(iii) Specialists' training, and that of the most intelligent men which will vary with the number of special cadres formed. Understudies should be trained for all specialists and key men such as the Chief Clerk, Q.M.S., etc., who could take over at once if they become casualties. One cannot train too many men in clerical work. The M.T.O. should train understudy drivers from among the R.A.M.C.

Individual subjects may be allotted to various officers who divide them up into hourly periods and then discuss each précis with the C.O. If the familiar and important subjects of First Aid is taken as an example, the series of lectures up to about N.O. III standard might be: (i) Structure of Cells and Tissues; (ii) Bones and Muscles; Structure and Functions; (iii) Fractures—

Diagnosis and Treatment; (iv) Circulatory System; (v) Hæmorrhage—Symptoms and Arrest; (vi) Composition of Blood—Mechanism of Clotting; (vii) Transfusion and Transfusion Fluids; (viii) Anatomy and Physiology of Lungs; (ix) Chest Wounds; (x) Digestive Tract; (xi) Abdominal Wounds; (xii) Renal System; (xiii) Bladder and Kidney Wounds; (xiv) Wounds of Upper Limb—Splints and Slings; (xv) Wounds of Lower Limb—Splints, etc.; (xvi) The Thomas Splint; (xvii) The Rifle Splint.

This example illustrates the importance of the careful preparation and breaking down into periods lengths which must be done before the teaching of any subject is begun.

Revision Periods, questions and answers, should be done frequently, and a Test of Individual Training at the end of each Quarter, to assess how much has been achieved in each subject. In theoretical subjects these tests may take the form of a written paper which also helps one to see which men are capable of clear thought and can express themselves well.

Examples of Subjects split up:

Minor Tactical Exercises.—Instructor-Major ———, Cadres-Corporals A & B Secs Sjts- C & D Secs. Each instructional period to consist of four hours. Cadre instruction Weds 0800 Relay instruction Fri 1300. i.e. N.C.O. instructors pass on to Sections what they learn from the officer instructor. All reconnaissances and sites for exercises notified to C.O. a week in advance.

Task 1: Establishment of C.C.P. in open country, according to diagram shown in Information Room. Dispersion to be practised.

Task 2: C.C.P. in thick wooded country, use of natural camouflage, and attention to shifting shadow. Proper sign-posting practised.

Task 3: C.C.P. in buildings. Reconnaissance of buildings, blackout, etc.

Task 4: C.C.P. to open, close, and move twice. One vehicle to be "knocked out" and the doubling up of loads practised.

Task 5: C.C.P. crossing trackless country using only jeeps to carry essentials. Practice creation of a "B Echelon" for the less essential stores.

Task 6: C.C.P. opening, closing, and moving by night.

Task 7: C.C.P. crossing minor river obstacle. Stores to be manhandled and vehicles to cross empty.

Task 8: C.C.P. working split—half of it left behind holding casualties. Methods of keeping touch to be practised.

Tasks 9 to 12: The above lessons to be fitted into a series of Tactical Exercises, during which in even numbered tasks A & B secs can act as C.C.P.s and C & D as R.A.P.s, their personnel other than drivers and the N.C.O. in charge being allotted casualty labels and being evacuated. For odd numbered tasks the roles are reversed.

Physical Fitness.—Chief Instructor—the unit Sports Officer. No cadre required.

One hour's P.T. a day, under N.C.O. i/c P.T. Orderly Sjt to ensure attendance of employed personnel.

Assault Course to be laid out and each Group to spend an hour a day on its construction until it is completed. Everyone to go over it twice a week.

Digging: Each man to dig his own P.A.D. trench, and slit trenches to be dug on all exercises.

Route Marches lasting at least four hours a week. The route should be reconnoitred and published in orders. On one day a week the Orderly Officer should take over the same route all those who missed the march for reasons other than unfitness.

Men of Field Ambulances should be allotted vacancies on Courses of Instruction arranged by the G Staff, and may be attached to other units within the Division to learn other subjects. The Courses most likely to be useful are Driver Mechanics Courses, and Weapon Training for the R.A.S.C., Chemical Warfare, Educational Instructors Courses, and Courses for Clerks, including Pay Clerks, and for C.Q.M.S.s, Animal Management if Animal Transport is to be used, and courses in the handling of Assault Boats especially those with outboard motors.

Attachments to other units may include that of Carpenters to a Field Squadron R.E., and Sanitary Orderlies to the nearest Field Hygiene Company. The unit M.T.O., who must act as Weapon Training Officer for the R.A.S.C., may be made responsible for any training in handling arms or throwing grenades which may in certain circumstances have to be given to the R.A.M.C. Promotion Cadres of a fortnight to a month may be formed to train potential candidates for promotion to Corporal and Serjeant; and Instructor Cadres for training unit instructors who will then pass on their knowledge to their classes, may be organized in such subjects as Chemical Warfare, Transfusion, Map Reading, etc.

It will be seen that by no means all of the available hours are accounted for but there will be no difficulty in filling in the hours when one remembers the claims of Educational and semi-recreational training, Padre's hours, and the many subjects described in the body of the article.

The First Aid syllabus will serve for men who have still to take their N.O. III examination, but for those who have got their qualifications a greater proportion of the time should be spent on Hæmorrhage, Shock and Blood Transfusion, and this could be done by giving only the briefest outlines of such subjects as the Anatomy and Physiology of the Renal and Digestive Systems, etc., and using the time thus saved for revision and questions on those subjects which are of particular importance to Field Ambulance men.

WET WEATHER ALTERNATIVES

It is useful to have a list of Wet Weather Alternatives, which are numbered and so can be laid on very quickly when a change of programme is necessary for any reason. These include Practice in Message Writing,

Revision of Hæmorrhage and Shock, Bandaging and Splinting, Ten minute lectures by the men themselves, various forms of recreational training including language study, making and painting signs, making up tins of pre-sterilized dressings, etc., and the reading of unit Standing Orders for War. The choice of subject is left to officers in charge of Training Groups. Occasional days must also be given to Section Officers for training their men on their own lines. In language study one should concentrate on the language of the enemy, and of allied troops, etc. Considerable initial enthusiasm at the outset is apt to decline as the earlier stages are passed. Many of us must confess to reaching Lesson 12, only to lose heart as the rules of grammar begin to savour of the schoolroom. However, a lot can be achieved if each day a useful phrase in one or more languages with its phonetic spelling is published in Part I Orders.

*Echoes from the Past***SIR JAMES McGRIGOR, BART.****Surgeon-General Sir James McGrigor, Bart., K.C.B., F.R.S.,
Director-General of the Army Medical Services**

BY

S. LYLE CUMMINS*(continued from page 89)***PART II****THE WEST INDIES**

THOSE who know their "Roderick Random" will realize what it was to be sent to the West Indies during the eighteenth century. For the "other ranks" at any rate the experiences must have been very like those of Bob Rattlin and others so vividly told in his great novel by Tobias George Smollett. The conditions cannot have improved much in the early years of the nineteenth century while the ships were still the same "wooden walls" that had made Old England famous and yet hid so much misery for the sick and wounded below decks.

The Connaught Rangers were, however, embarked on board a large and roomy vessel, the "Jamaica," and there awaited the order to sail. Meantime McGrigor sat at his ease writing letters of farewell to his friends and dealing with the many things that had to be committed to writing before a long and eventful voyage. As he was so engaged, the Commander and the Adjutant of a party of men drafted to the regiment came on board and said that the Surgeon of the 88th should accompany them at once to inspect the men. "I merely exchanged the slippers I had on for a pair of boots, put a boat-cloak over my shoulders, and jumped into the boat alongside." A long and heavy pull brought them alongside the transport and, as it was already very late before McGrigor had examined all the men and as, moreover, a heavy wind had now arisen, he accepted the invitation of the Commandant to dinner and a bed on shore for the night and made himself as comfortable as he could under the circumstances. In the morning he heard gun signals which, as subsequently explained, were intended for the Mediterranean vessels only but were misunderstood by those intended for the West Indies also, and, having ascertained that all the men of the draft for the 88th had deserted during the night! secured a boat and went in search of the "Jamaica" but found that she had already started. Nothing daunted, he hailed a ship called the "Betsy," getting aboard with the 48th Regiment, so that he might pick up his own ship as soon as possible. The officers on board were very good to him, lending him clothes and making him as comfortable as possible

though he hoped to regain the "Jamaica" fairly soon. This, however, proved a false hope for, as day succeeded day and as vessel after vessel was hailed, there was no sign of the much-desired ship.

Still he hoped that the explanation lay in the faster sailing qualities of the "Jamaica" and so settled down as comfortably as might be on board the "Betsy," getting the cabin reserved for a certain Colonel Malcolm who had been left on shore in the confusion. He found on board various officers who proved to be very good fellows, Captain Airey, for instance (later to be Sir George Airey, the Quartermaster-General in the Crimea), and others. Thus, with such kit as he could borrow and such arrangements as he was able to make, he settled down for what proved to be a six weeks' voyage to Barbados very comfortably and with no misgivings. The brush of Smollett made the life in one of the old sailing ships comprehensible, but how different was the experience of a military officer travelling with reserved accommodation on board a good ship like the "Betsy" with fairly favourable weather and freedom to do just what he liked. The six weeks of the voyage must have slipped by with the busy idleness of a pleasant dream. But a rude shock awaited McGrigor on arriving at Barbados. *There was no trace of the "Jamaica."* Had she not started? Or was she now in some other port of the West Indies? The main fact was that the ships of the fleet had not yet arrived. The "Betsy" appeared to be the only one as yet. Whatever had delayed the rest must have delayed the "Jamaica" too. A fortnight later the West India ships began to arrive but there was not yet any trace of the awaited vessel. Then the truth was ascertained from the Captain of another. It seemed that the "Jamaica" had been obliged to delay for some trifling matter of repair and had gone into Gibraltar to have the alteration carried out. On leaving Gibraltar to continue her voyage she had been so unlucky as to fall in with a French frigate, the "Tribune," and had been captured and carried to Brest. The officers of the 88th had been very badly treated by the Captain of the "Tribune" and had had most of their kits and valuables taken from them but, as McGrigor learnt afterwards, they had finally been exchanged as Prisoners of War and had been sent back to England. As to the non-appearance of McGrigor himself, it had been ascertained that an officer had fallen between two ships and been crushed to death and it had been taken for granted that this was the fate of McGrigor! He had been reported dead by his own brother and replaced by a surgeon from the Glasgow Regiment, one Hamilton, who does not appear to have been very popular! So much for the explanations that were forthcoming later.

For the present, McGrigor appears to have fallen on his feet as usual and to have been appointed to be the head of the Medical Staff at Grenada, the self-same island where Smollett, in the person of Roderick Random, described the attacks of the British on the Spanish positions some half a century earlier, and where there appears to have been still considerable opposition. Reports had reached Barbados that the whole of Grenada with

the exception of Georgetown and of Richmond Hill was in possession of the negroes—and such of the French as were in arms there—and it had been determined to supplement the garrison there and proceed against the blacks. McGrigor, as I have said above, was sent to Grenada as P.M.O. and the force, though greatly crowded, landed at St. George's safely and proceeded to Richmond Hill some miles away. After a time he was sent in medical charge of a party under Colonel Dyott of the 25th Regiment and had hospitality from a planter on one of the little islands that are so abundant in the neighbourhood. Then he, with a number of others, started for "Madam Hook's Bay" but the whole party was shipwrecked on the way and, though nobody was lost, still McGrigor and others had a very close shave of it and all his kit, which he had had such difficulty in bringing up to something like correctness, was missing. McGrigor speaks of a number of them crowding on board a boat that had been brought round to help them and he mentions how, with the boat full so that one more would have been one too many, he and others had to harden their hearts and forcibly prevent a woman from getting on board; one more woman one too many! So they got to the land and had a very uncomfortable time of it, McGrigor bemoaning the loss of all his kit and all his money as well. And then some hours later an honest Serjeant appeared with a portmanteau of his with one or two hundred dollars inside it: judge of McGrigor's feelings when the Serjeant's wife, who had actually rescued it, turned out to be the same woman whom they had turned away in her attempts to get on board the boat!

Meanwhile, a detachment of the 88th, under Captain Vandeleur, which had reached Barbados, came on to Grenada where McGrigor joined it, and great were the rejoicings when, once more, he foregathered with his own regiment. But I continue to think of that heroic woman who had rescued his portmanteau for him even when he had restrained her or assisted in doing so from getting into the boat which would have brought her to safety! "Of such," it appears to me, "are the Kingdom of Heaven." In the meantime the Negroes had to be turned out of the positions which they held and the 88th, with other regiments, had to do the turning. In the operations which ensued, the 88th got into difficulties and was, for the moment, cut off and badly handled by the blacks.

Here is McGrigor's account of the fighting: "As the men fell or were wounded the latter were brought to me under a tree. While engaged dressing their wounds, the situation being rather an exposed one, a gun was opened on it and one shot killed two of the wounded close to where I stood. I felt something moist on my face. At the same time I observed the two poor fellows dead and terribly mangled close by me; and a Serjeant came up to me and, taking me by the arm, told me I was wounded and that he would assist in placing me on the grass. I said I believed I was *not* wounded but, as he insisted, I was placed on the ground, where, on rubbing my face, I found it covered with the blood and part of the brains of one of the poor

fellows near me; and getting up I convinced the Serjeant that I was not wounded. In a very short time after this I found the men and officers in rapid retreat and passing me. I lost no time in joining them and, I confess. I never made better use of my legs!" . . . "The bullets tore up the ground close to us on either side and even between our legs; how we escaped was to me a miracle." The Blacks, and as many of their French friends as they had with them, appear to have put up a very good show and there was severe fighting. The position, however, was at last taken, and remained in English hands. The 29th Regiment appears to have especially distinguished itself in this engagement.

After all these adventures McGrigor was attacked with severe dysentery and found it necessary to return to St. George's. The General, on hearing of this, took the opportunity of charging him with the Despatches for England which were to be forwarded by the Officer in Command at St. George's, and he started off hoping to reach his destination all right. Dysentery, however, is a serious affliction and so bad did McGrigor's dysentery become on the way that he persuaded the Captain of the schooner in which he had sailed to put him on shore at a point about four miles from Richmond Hill from which he hoped to make his way thither on foot instead of waiting on board for another week or so. But his internal adversary did not spare him and he was obliged to seek refuge in a house near-by. There appeared to be no one about and so he waited, being unable to go forward. Then somebody made his presence felt and McGrigor attempted to rise and make himself known; and then, wonder of wonders, there appeared a very familiar figure, a figure which he had been very familiar with at the Medical School of Aberdeen, that of a Mr. Pemberton, a West Indian whom he had known well as a medical student in the old days and was particularly relieved to encounter in his extremity. Pemberton was very kind to him and, after he had rested a while, put him on a horse with a man on each side of him and rode with him into Richmond Hill, seeing him into a place where he could be looked after until the dysentery was better. Here he found a large force with whom he joined up as he became once more master of himself. The French prisoners, many of whom had been active agents in the murder of a former English authority, Governor Hume, were here on trial. "In one day about twenty of these French prisoners were executed on a large gibbet in the Market Place of St. George's, leaving wives and families behind. It was said that the greater part of them possessed incomes of upwards of £1500 per annum." This wholesale execution was in keeping with the times, no doubt, but would be regarded rightly as plain murder nowadays.

Grenada was finally reoccupied by the English and things became quiet again but, as a result, perhaps, of this sudden peace and the want of occupation and of dispersion of the troops became very sick. "The number that died of yellow fever was four times that of those that fell by the bullet and by the bayonet." "I feel convinced that, in many cases, the disease was communi-

cated by contagion *although not in its origin a contagious disease.*" So said McGrigor, his thoughts full of the causation of a malady that has since been proved to be transmitted by the mosquito. How did he know that the yellow fever was not, in its origin, a contagious disease? So bad did the "Yellow Jack" become that the first question put to an official on entering the coffee room was "Who died yesterday." Almost always the answer was some name or names well known on the island.

RETURN TO ENGLAND

The Connaught Rangers now received orders to return to England. To return home again! That is the best news that a soldier can have. No doubt it was the same in McGrigor's time as it is now; but many a brave fellow, cherishing in his breast the thought of seeing his people again, or longing for wife and child, must have embarked full of hope, only to find a grave in the vast ocean, a victim to "Yellow Jack." For that was the fate awaiting a great many of them as we shall see as we continue our story.

As for McGrigor himself, however, the thought of leaving the West Indies, where he was just making himself known and enjoying an increasing number of friends, was not so very welcome. And, to further such ideas, a certain Dr. Reynolds, of one of the local regiments, wished to negotiate an exchange. They decided to meet and discuss the matter and, for this purpose, Reynolds came to dine with McGrigor in the Mess—where everything might have been settled but that the guest became so excited as the result of redundant hospitality that he was quite unfit to discuss *anything*! So, at last, he was hoisted on to his horse and, accompanied by another officer who promised to see him home safely, started for his quarters, the question of the exchange being postponed until he should be fit to discuss it in a more reasonable frame of mind. Next day, McGrigor, to his great sorrow, heard that poor Reynolds was dead. He had been attacked with what was said to be violent diarrhœa and had succumbed before anything effective could be done for him. And so the intended negotiations came to an end and McGrigor left for England with the regiment.

But the 88th was now in for a bad time. Owing to the hurry of departure, the ship had sailed with very inadequate provisions and the rations on board were exceedingly short. "There was neither bread nor biscuits on board," says McGrigor. "A little rice only, in lieu of it was sparingly distributed to us; our only food salt and fresh pork alternately; our vessel very crank and the soldiers and crew dispirited." The next disaster was that the Captain died of yellow fever, an ominous happening in itself and made still more so for the crew by the accident that followed: The carpenter made a coffin for him but this was so loosely put together that, when thrown overboard, "as I pronounced the words 'We therefore commit his body to the deep,' the planks came apart and the body uncovered floated upon the sea, to the horror of the sailors." The great thing, now, was to find another man to act

as Captain in the place of the departed and this proved not a very easy task. The first chosen proved absolutely unsuitable. He was "so constantly drunk" that he could not be trusted at all. In this extremity it was decided to place Captain Vandeleur, of the 88th, who had already passed several years as a midshipman, in charge of the ship as Captain, which duty he carried out as best he could though rather badly. At last, however, he managed to bring the ship safely into the Cove of Cork where the officers were delighted to put up at a little inn on the pier where, for the first time for long, they were able to eat good food again. They were given a "security" by the General Officer Commanding, General Massey, afterwards Lord Clarina, while the old ship, although reported as out of order and unseaworthy, was repaired for the journey across to England. This voyage, bringing the regiment safely back to the British Isles from the West Indies, had really been a very severe strain to the "other ranks" several of whom had succumbed to yellow fever shortly after the Captain's death from that disease and who must have suffered still more from the deficiency of rations than the officers themselves. It can be imagined, without much exaggeration, that the conditions described by Smollett in "*Roderick Random*," were reproduced fairly closely; "But when I followed him into the Side Berth or Hospital and observed the conditions of the patients I was much less surprised that people should die on board than that any sick should recover." Smollett, in the character of *Roderick Random*, describes the patients on board ship as "deprived of the light of day as well as of the fresh air, breathing nothing but a noisome atmosphere of the morbid steams exhaled from their own excrement and diseased bodies." Let us hope that conditions had improved somewhat half a century later.

Now, however, all was well again. The sick-rate of the men was less and there was no Yellow Jack to be feared. The "*Betsy*" was repaired and they had a safe passage to Portsmouth where, after a few days of quarantine, the whole ship's company was liberated.

The 88th moved to Halifax, where the clothiers had been very turbulent of late and where the presence of a regiment was felt to be desirable, McGrigor himself taking a few days of "leave" to London. On his way to the Northumberland Coffee House where he usually stayed when in Town, who should he meet but Maconnachie, his old friend who had been so good to him in the Low Countries. But what a change had come over him! "He breathed hard and spoke but few words which were almost inarticulate. I ascribed this to his wonted disease, asthma, with which he was frequently affected but he still grasped my hand without saying anything, looking very pale." The reason of all this emotion was explained after a glass of wine in the Coffee House where Maconnachie explained that, for months, he had believed McGrigor to be dead. He had heard from a Dr. Robertson in Barbados that his friend had been amongst those killed at the engagement in Grenada. "We dined and spent the evening together at the Northumberland Coffee House and we each recounted our travels and adventures since we last parted." It is not difficult

to imagine that the two had a great deal to tell each other and that they kept the waiters busy during long hours at the Northumberland Coffee House.

The three Companies of the 88th joined the Headquarters at Halifax and, after the great reception was over, they settled down as a regiment to enjoy a period of tranquillity. McGrigor found his brother here, now a Lieutenant, and they must have had much to tell each other from the supposed death of our hero, which his brother had mourned, to the evacuation from France, as exchanges, in which his brother had taken part. But regiments did not have much time to remain inactive in those days and the Connaught Rangers were interrupted in their repose by sudden orders to repair to Southampton to embark for Jersey; their old port of departure on a former occasion. On the way they heard of the Naval Mutiny on the *Nore* and hurried forward by forced marches towards what appeared to be a very serious affair. They were, however, stopped at Petersfield for three days and held in leash there while the Mutiny went through its course. It was here that they encountered the Captain of the French ship, the "*Tribune*," which had captured them and held them prisoners some time previously. This man was now, in his turn, a Prisoner of War, and the officers were inclined to get back a bit of their own, now that he was at their mercy! But Colonel Beresford, in spite of considerable feeling, insisted on inviting him to dinner and making him a Member of the Mess, showing him, in fact, every consideration in his power; a good example to some of the youngsters who did not quite appreciate generous conduct and its effects! Then the regiment resumed its march to Portsmouth, which town it reached in due course, to find the mutiny in full swing. It was impossible for an officer or a private soldier to be seen in the streets without being insulted and they had to go out, several officers or men together. "At this time the Corps of Officers of the 88th, about 30 in number, took places and went to the Theatre together. A great body of soldiers, all Irishmen, got tickets for the Gallery where there were many disorderly sailors with their dissolute female companions. We called for 'God save the King.' After a bit of a struggle this was sung and was always sung from that time onwards at the Patent Theatre." About this time or soon after the conciliatory measures of the Government took effect on board the Fleet and they gave up their delegates.

INDIA AND THE EAST

"On Christmas Day, 1798, we embarked at Portsmouth for India and arrived at Bombay about the middle of the following May." About six months spent in getting to India from England: a fairly good passage for those days; when I myself went to India by the Suez Canal in 1898 we took altogether about three weeks; now they do the trip in a couple of days by air!

In those days they must have gone round the Cape but they were in touch with many places for the getting of provisions until they had to cross the Indian Ocean where, no doubt, they suffered from deficiency disease for want

of fresh vegetables, for McGrigor, on noting the arrival of the ship at a position just north of Ceylon, mentions that they made good this want and that "our stock" of vegetables and fruit "had the effect of arresting scurvy." On their way to Bombay they stopped for a time at the Island of Johanna which is in the Comarin group. "Soon after we dropped anchor the King of Johanna came on board attended by some of his dusky Ministers," says McGrigor, and he also mentions that the dark lady who washed his clothes for him, adopting an English name as did many of her companions and contemporaries, was known as the Duchess of Devonshire! No doubt she washed his clothes none the worse for her magnificent designation. At Johanna they were able to provide themselves with "a good stock of cocoa nuts and such vegetables and fruits . . . as the island afforded." It must have been a wonderful change for the men, especially, and also for the officers who, poor fellows, had not tasted anything fresh, in the way of meat, milk or vegetables for a considerable time.

From Johanna they made their way up the coast and finally reached Bombay where, for some time, they stayed as part of the garrison. The Connaught Rangers were stationed at the island of Colabah, connected with the mainland at low tide, where they appear to have been very comfortable. McGrigor mentions particularly the kindness and hospitality shown both personally to him but also to the regiment by the General Officer Commanding at Bombay, Sir James Stuart, and he became very intimate with many of the Medical Officers in the Company's Service and contracted lasting friendships with them as well as with the local Practitioners. With one of them, Doctor Helenus Scott, he contracted an intimacy which lasted for twenty years, both in India and, afterwards in England, until the death of Dr. Scott brought it to an end.

The 88th must have spent some fifteen months at Bombay. They had reached India in May 1799 and had been long enough in Bombay to allow McGrigor to contract many friendships there and to become accustomed to the place. But a British regiment was liable to be warned for anything that was going forward and, sure enough, the Connaughts were suddenly ordered to embark again and to proceed to Ceylon "for a particular service." McGrigor mentions that they were opposite Goa on St. Patrick's Day—which must have been in the year 1800, though it is extraordinary how few dates are given in his autobiography to guide us as to the years. On this festal day, so much counted on in an Irish regiment, they celebrated gloriously, as appears from the following: "Sir William Clarke sent us off a basket of vegetables, fruits, and especially the fine Goa mango." "Colonel Beresford contributed from his private stock some champagne to drink the health of the Patron Saint of the day, and I contributed six bottles of fine old hock from my stock. We passed the day in the most good-humoured conviviality and there was a dance in the evening for the soldiers and their wives." The Sir William Clarke mentioned was probably the G.O.C. and Governor. There was a British regiment at Goa.

the 84th, and presumably several Native Corps, so that there was probably at that time sufficient troops to warrant a general at that station. At Ceylon they found the 10th and 51st Foot at Point de Galles, the 80th at Trincomalee, while soon after their landing, European and Native Corps daily joined them from Calcutta, Madras and Bombay. On an expedition to a lake fairly near at hand McGrigor had to intervene to stop the shooting of monkeys. "One of the latter gave such human-like cries when wounded," but the officers shot a lot of wild turkeys, so he says, and various other birds of the island. But, although allowing himself occasional days on shore, McGrigor did most of his duty looking after the sick of the regiment on board ship while he designated Bruce, his assistant, to carry out this work on shore. "Of the cases which came under my care in the hospital on board ship a large proportion was what is called Guinea Worm."

The expedition from Ceylon had been intended for Batavia but, as the regiments concentrated there, a despatch came out from England ordering it to proceed to Egypt and, before going there, to return to Bombay. The Expedition's new destination was determined by recent events and the necessity "of expelling the French from the dominions of the Grand Signor" where, once fixed, there was always the possibility of their invading the Company's territories in India. The expedition was at that time intended to be under the command of Colonel Wellesley who was then in Bombay and McGrigor was introduced to him there by Dr. Helenus Scott. Here, too, McGrigor was paid the great compliment of being appointed head of the Medical Staff of the expedition by his friends of the Medical Board of Bombay "with a Company's Commission or appointment of that character," the first King's officer, so he says, ever to be employed in that capacity. A sudden illness, however, was destined to overtake Wellesley and to lay him up so badly that he had to give in to it and Brigadier General Baird was finally appointed to take the command in his place. This is the first mention of Sir David Baird in the Autobiography but by no means the last. As we read through McGrigor's records, we shall encounter many recollections of this gallant officer and many tributes to his efficiency and kindness.

So the expedition left Bombay in a great hurry; it seemed that their duty was very urgent and the ship carrying the Connaught Rangers contained, also, a great many cases of guinea worm, the creatures showing in their victims as a raising of the skin corresponding to the length or part of the length of the worm and an obtruding of the "head"—it was probably not the head at all but a portion of the uterus—and the tendency to form painful abscesses if the worm burst into the tissues of the host. The only form of treatment was to catch the end of the worm in a little bit of split stick and to wind and continue to wind daily; woe to the unfortunate medical man who should wind too fast and tear the worm so that the contents poured out into the tissues! The result was, nearly always, a severe and septic abscess where the embryos had fallen on the exposed surfaces. Dr. Bruce, the Assistant Surgeon, was one of the

victims and had a very painful infection of each of his legs. Meanwhile a steady wind brought them past the opening of the Persian Gulf and to the Straits of Bab el Mandeb. The vessel touched at Jedda and at Mocha, at the latter place taking on board "a stock of the far-famed honey which was both rich and delicious." They had a bad time, owing to unfavourable weather, from Jedda onwards to Kosseir. At that place they disembarked under the orders of Colonel Murray, Admiral Blankett having made arrangement so for them in advance. "The arrival of transport after transport, numbering not less than 100, with troops, provisions and cattle, etc., occasioned no little bustle in the miserable little mud village of Kosseir." Here McGrigor, assuming, for the first time, his authority as Superintendent of the Medical concerns of the Army, made several appointments, such as an Apothecary to the Forces and a Purveyor, the latter position being filled by a Mr. Small of the 8th Light Dragoons, a man previously known to McGrigor and in whom he knew that he could have confidence. We can imagine, though it does not appear in McGrigor's account of things, what anxieties now fell upon Sir David Baird, the General Officer Commanding, who was responsible for the whole movement of the troops to Cairo or as near it as might be possible, and who had to face all sorts of difficulties at the start. He found that a great many bags in which grain had been packed had been worn through and were empty and that many of the mussocks for water were deficient or useless; at the same time he found, also, that the troops were to face an almost waterless march in order to get to Quennah (Kennah) on the Nile.

He wrote to Colonel Beresford, who was now a Staff Officer, of all these things and went forward for temporary work to about twelve miles from Kosseir to see things for himself. There he decided to send on the 10th Foot to Moilah, and from Moilah to Legata, where there was reported to be water in plenty at a place called Mansh-har near-by; at least by digging for it; and so on. He returned to Kosseir on June 22 and was met by a rumour that there were about 15,000 French troops at Cairo who would have to be dealt with. On the 24th, having completed his arrangements for provisions and water, he was in much better spirits and feeling quite confident again. "We must trust to the 'Puckallies' (mussocks) or find water in the desert!" Thus he muses: "The 88th must take their puckallies to Legata and, after the next day's march thither, send them back to Legata for the next Corps." The 10th should take their bags to Moilah and, after the next day's march, send their bags back to Moilah for the next Division."

Thus did Sir David Baird overcome the difficulties of getting his troops over waterless distances of thirty or forty miles; a very successful method as we also found in the Sudan when we were faced with the same problem; but we imagined that we had hit on a new technique whereas Baird had been before us with it by over a hundred years—and probably many before him! ("Life of Sir David Baird.")

We return to McGrigor who we had left at Kosseir struggling with his own

problems as well as with a bad attack of fever—no doubt, malaria—an attack which was not allowed, however, to interfere with his duties of Senior Medical Officer, as had been his charge from the start. Here he met with a great deal of obstruction, at first, from the medical officers of the Company's troops from the Bengal and Madras Presidencies who did not know him and who did not like, incidentally, to find themselves serving under a King's officer; but all this feeling passed away as time went on and he became known to them and he is able to speak of "the most readily perfect obedience on all occasions" as characterizing these officers under the stress of war and of desperate illness which the campaign was destined to bring forth.

The Connaughts succeeded in crossing the desert without great difficulty owing to Sir David Baird's scheme for carrying water and the regiment rested at Quenna, as did all the formations arriving, for a while. In this interval, a Dr. Shapter arrived from England who was senior to McGrigor and to whom the latter handed over; but it was arranged that McGrigor should continue in charge until Egypt was reached when it would be, in any case, necessary for a senior British Officer to take charge of all the Troops.

From Quenna, Dr. McGrigor left by the first "Djerm," or the first *gyassa* as we should have said at a later time, and in her got safely to Ghiza where was the first portion of the English Army. Here Dr. Frank, Inspector of Hospitals, was in charge and at once asked McGrigor for returns of the sick from the Indian Army. This does not seem a great thing to have demanded but McGrigor refused to provide them and was supported, in this, by Sir David Baird; which shows that the two divisions of the forces were separated by an intricate kind of gulf across which it was not considered quite tactful to pass! There was nothing, apparently, of a personal nature about this. Dr. Shapter, for instance, who was much run down after the crossing of the desert, was quite naturally the guest of McGrigor who was already installed. He himself, however, was shortly laid out with a severe attack of some kind of fever, probably malarial in type, but thought at first to be the plague until, in a very few days, his health recovered to an extent which became complete after a voyage to Rosetta. On this voyage, which was executed as part of the movement of the 88th, the men were, as usual, very kind "when they saw the Doctor in such a state." So kind, in fact, were they that they stole a sheep and some chickens for him! He had to pay for these when the facts came out.

McGrigor, once at Rosetta, became his old self again and settled in very comfortably. He was now at El Hamed and settled there with his usual attention to his own conditions. "I had upwards of a dozen Indian servants, with their wives, besides my English soldier-servant, and, for my stock, three camels, two horses, twenty-three sheep, three goats, several dozen fowls, with a good many rabbits, pigeons, etc." "My own large Indian Marquee was in the centre and around were small Arab tents which my servants had raised for themselves. . . . Outside the whole I had a high mound thrown up, made from the vegetation of the bank of the river, having only one large gate to my

premises." Accommodation on this large scale must have allowed of much hospitality, for one thing, and have invested him with the kind of sumptuousness which he thought his due. Nevertheless, he now devoted himself entirely to the medical care of the Connaught Rangers only, Dr. Shapter once more having the superintendence of all the troops, British and other.

After a little while, however, General Baird appears to have grown tired of doing without him and asked for him back as S.M.O. to the whole of the Indian Forces; this being at once allowed. McGrigor now turned his whole attention to steps to be taken in case plague appeared; this dreadful disease had not yet visited the troops but it appeared certain that it would soon be a heavy scourge, the season of plague being now almost on them. It was therefore necessary to have pest-houses ready as well as houses of observation, quarantine, etc., as well as the formation of a Board of Health. All these things were accomplished through the kind help of General Baird. The whole of the Indian Army was now moved to Alexandria, the English Army being, for the most part, embarked for home.

The troops from India were now quartered at Rosetta, Damietta, and such places as were conveniently near to Alexandria, and McGrigor had his own Headquarters at Alexandria itself. The regimental hospital of the Connaught Rangers had, amongst other conveniences, two large rooms, each with a court in front, in one of which McGrigor, apportioning it as a "receiving room," had three large portable baths arranged, where every man was washed prior to his being admitted and given "hospital clothing." And yet, in spite of these sound sanitary precautions, it was in the 88th that the plague first appeared as if to mock the man himself who was taking such elaborate precautions against it! "One morning," he says, "as I was leaving the hospital, . . . I passed the receiving room and observed that one man who was coming out of the bath had buboes both in the groin and about the neck. . . . On my noticing this to the Hospital Steward he told me that several of the last admissions were so affected; and added that every one of the three corpses then in the Dead House, of men who had died the previous day and night were so affected." Here, then, was the Plague! The disease which everyone dreaded and which was known to be so fatal; and it was here, in the hospital of the Connaughts, that it had started! He reported at once to Sir David Baird who took the intelligence very quietly and only enjoined silence: issuing, however, the necessary orders "as to the carrying into effect of the precautionary measures which I had suggested."

The remaining time in Egypt was, in great measure, a hard struggle with that deadly disease, which, to the then medical officer, must have appeared the most obscure and the most mysterious of epidemics, appearing in spite of the most thorough precautions. Even had they known, as we know now, of the rôle of the flea in its transmission, they might still have struggled in vain to protect the natives or the rank and file in a country where the habits and the customs were all against them, though the officers and some of the men must have been saved from such a pest. All this, however, was in the womb of the

future and the cases were to appear in their midst without any clue pointing to the facts of the transmission from one to another. We shall follow the steps which McGrigor took in dealing with this plague epidemic when we start to examine his little book about the diseases of Egypt; a book specially written to describe his experiences with disease. But we must now quit Alexandria and follow him to the south as he prepares for the return of the Anglo-Indian troops back to their base, temporary or permanent, in India. Hostilities with France had now ceased and the country was quiet. McGrigor now proceeded to Cairo by "Djerm"—another name for Gyassa—and made contact with the rest of the Indian army, acting as their Senior Medical Officer and, in this capacity, preparing for their transport back to India.

It was at this time that he met with a little bit of romance which deserves to be recounted; not that it led on to any romance in his own history! When close to his Quarters he suddenly heard the screams of women and the rush and clatter of hoofs. It proved to be the case that three Greek or Circassian ladies were being rounded up by some Turkish soldiers who evidently had the idea of carrying them off for condign punishment. McGrigor, leaping on to his horse and shouting to his servant to come on with another, galloped hard after the miscreants and finally, after a long chase, put them altogether to flight; the Turks never turned on their pursuer and his syce though they might have done so very effectually had they had the courage, for neither McGrigor nor his man were armed. He now turned back to where the beautiful ladies were that had so closely escaped capture and found that they were some of the camp followers of the French army, now left to manage as best they could; the "*chères amies*" of French officers now deserted! It is very probable that they were subsequently re-captured by their tormentors for it was common for the Turks to punish these women for their offences against the faith by taking them away, tying them up in sacks, and then slipping them into the river! Nor was it only women who suffered; Mohammed, the servant of Captain Vandeleur, was very harshly treated when he went home as the result of his having been the servant of an Infidel and he therefore hid himself, as a stow-away, on the ship that carried McGrigor to India where he was discovered and remained the faithful servant of the S.M.O. himself for many years!

He had two more adventures: one following attempt was made by him, with Dr. Dick, Surgeon of the 80th Regiment, to ride to Suez and back, passing close to Moses' Well; It proved too much for them and, as a result, McGrigor had to ride in search of help for Dick who was altogether overcome by the fatigue and the absence of water. Again, McGrigor himself got into extreme difficulties while riding to see a man of the 7th Bombay Native Infantry who had been suddenly stricken with what seemed to be plague just as the Regiment was about to embark. The distance was really too great for one man and one horse, with only one day to do it in! He did it, however, but seized with a terrible thirst had to drink filth from an Arab well and to collapse in a Colonel Macquarrie's tent, before seeing General Baird. The regiment was temporarily

stopped from embarking, however, with Sir David Baird's authority, and McGrigor retained a wonderful memory of that cup of tea which Colonel Macquarrie provided for him in his extremity!

Though written several years later there is no better account of his sojourn in Egypt than that contained in his book, "Medical Sketches of the Expedition to Egypt from India." I therefore propose to give a sketch, from this publication, of the strictly professional notes about the expedition and, particularly, about the plague, as met with in epidemic form, during the expedition.

Now that we know the secret of the transmission of plague, at least in its bubonic form, from the sick to the healthy, by means of the infected flea, and of its direct transmission, in its pneumonic manifestation, from one human being to another, we realize what a serious malady it is and how hard to stop in a native or a military community; but nowadays we are in a position to act scientifically and we know, at least, that without the intervention of the flea, the bubonic type, the commonest, is not transmitted at all. This knowledge gives us great confidence in the protective effects of cleanliness and how anti-flea measures can be successful. It must have been terrible, indeed, to encounter the plague without it.

(To be concluded)

DR. JAMES BARRY

ELSEWHERE in this issue our readers will find the Review of a book dealing, in novel form, with the life of this exceptional individual. From time to time much has been written about her—and, no doubt, much more may be written in the future.

It so happens that, coincidentally with the appearance of this latest book, there has come into our possession a copy of a photograph of Dr. Barry together with an individual described variously as a "Malay Slave" or a "Coloured Servant." For this photograph we are indebted to Major T. A. Yorke, M.C., R.A., who sent with it a letter written to the Editor of *The Times* by his father, the late Colonel F. A. Yorke, in 1919.

It will be noted that there is some divergence of opinion as to the last resting place of the worthy Dr. Barry. In an article entitled "The Lady Army Doctor," by Marianne Robertson Spencer, which appeared in *The Lady's Realm* some years ago, the burial place is given categorically as "Kensal Green Cemetery, grave number 19,301; square 67; row 6." This is accepted as authentic.

It is interesting to note that Dr. Barry was commissioned as Hospital assistant in July 1813 when John Weir was Director-General. She became Deputy Inspector of Army Hospitals in May 1851, the year of Sir James



McGrigor's retirement. She served throughout the Directorships of Sir Andrew Smith and Thomas Alexander retiring during that of Sir James B. Gibson.

It is interesting to speculate whether Sir Harold Fawcus, Sir James Hartigan, Sir William MacArthur, Sir Alexander Hood and Sir Neil Cantlie could remain (presumably) in ignorance as to the sex of one of their senior officers. Now that Commissions are open to women it seems that Dr. Barry must remain a unique and enigmatic personality.

To the Editor of *The Times*

Sir,

I was much interested in reading an account in *The Times* of the 23rd inst. of the Play entitled "Dr. James Barry" and the following may be of interest to your readers. My father knew her well both in the West Indies and Mediterranean. I, as a small boy, was attended by her and can remember seeing her riding down to the officers' mess in the scarlet shell jacket of those days with the groom walking behind. It was always suspected that Dr. Barry was a woman. She died in Jamaica and was buried in Up Park Camp Cemetery in that island. I possess a photograph of her in civilian male attire with her negro servant standing beside her. It is said that Dr. Barry had fought a duel and also seen service.

Yours truly,

F. A. YORKE,
Col. late R.A.

Twyford. Winchester.
26 July, 19.

Notices

THE following two Officers have recently obtained the D.P.H.

Major W. M. Stewart }
Major D. D. Maitland } January 5, 1950.

Reviews

THE JOURNAL OF DR. JAMES BARRY. By Olgar Racster and Jessica Grove. Bodley Head. Price 15s. net.

This book is dedicated by the authors to Sybil Thorndyke for "her fine impersonation of Dr. James Barry" in their play which was put on at the St. James's Theatre.

In a preface dated 1932, the authors describe how they first, in 1911, became interested in the story by hearing of a local tale that the woods near Camps Bay, a suburb of Cape Town, were haunted by an apparition in Georgian Uniform—Dr. James Barry. Fragments of anecdote were collected, most of it handed down from the narrator's grandparents; little that was factual could be found though research was continued till 1919. The following extract from the Dictionary of National Biography was as illuminating as any:

"Barry, James (1795–1865) Inspector General of the Army Medical Department. A woman who passed through life as a man. Said to have been granddaughter of a Scottish Earl. Served at the Cape and at Malta. Lord Albemarle met her at Cape Town when she was medical adviser to the Governor, Lord Charles Somerset, as well as Staff Surgeon." "The most skilful of physicians and the most wayward of men." Died at 14 Margaret Street, London, July 25th, 1865, when official report was sent to Horse Guards that she was a woman. "Motive alleged for disguise—love of an Army Surgeon."

The story concerns a woman of gentle birth who, for reasons unknown, assumed male clothing and studied medicine in Edinburgh University. On qualification she became an Army Surgeon, went to South Africa in 1815 and rose in the Army Medical Department to become the Senior Inspector-General of Hospitals, as she is shown in Hart's Army List of 1865. There is record also of service in St. Helena and Jamaica.

It is a tale of the triumph of will over the handicaps of a frail body, of a skilled and fearless woman doctor who, in the early years of the nineteenth century, competed successfully with men ("as an accoucheur he was unequalled, and as generous as he was skilful"); a story of almost life-long deception as to her sex.

In such circumstances it is understandable that no diary should ever have

been found. The form of the book, with most of its story, is entirely fictitious. It is written as a diary in rather sententious language emulating the style of the period and tells a story which, though carefully fabricated, has woven in its fabric all the known facts.

The story opens shortly with tales of student life in Edinburgh but passes quickly to qualification in 1815, and her Commission as an Army doctor and posting to the Cape as Staff Surgeon and Adviser to the Governor, Lord Charles Somerset. The Governor is said to have known Barry's secret and, through this knowledge, to have been able to help him in many ways. There is a lively description of life in Government House circles at the Cape in those days, of delightful gardens, riding in the woods, and broad tree-shaded streets outlined by irrigation channels; of gossip and bickering in a limited society and of the laziness and ignorance of local medical practitioners whose bitter resentment Barry soon encountered by his energy and enthusiasm for reform. He was appointed Inspector-General of Hospitals, prison doctor and port vaccination officer.

An interesting account concerns his delivery by Cæsarean section of the wife of Thomas Munnik, a prominent business man whose family had South African records dating back to 1716. The child was christened James Barry Munnik and his son, similarly named, became town clerk of Wynberg, near Cape Town. The town clerk's widow possessed a miniature painted on ivory of Dr. James Barry which is reproduced on the wrapping of the book. It is very similar to a small portrait in the Headquarter Mess at Millbank and reveals a delicately featured individual with curly auburn hair, large lustrous eyes, a broad forehead and narrow chin tucked into the high collar of a scarlet tunic.

The town clerk's sister married a Hertzog and both the Hertzogs and the Munniks use the name of Barry as an additional christian name.

The book skilfully combines a few facts with what is mainly fiction and tells a colourful, if slight, story of conditions in Cape Town in the early nineteenth century. It is well worth reading by all who find interest in the story of one of the most remarkable officers who have risen to high rank in the Army Medical Services.

J. M. M.

SYNOPSIS OF MEDICINE—NINTH EDITION. By Sir Henry Letheby Tidy, K.B.E., M.A., M.D., F.R.C.P.Lond. Bristol: John Wright & Sons, Ltd. 1949. Pp. 1243. Price 30s.

This work, so well favoured for systematic study and isolated reference, has undergone extensive revision which has involved rewriting much of the subject matter and the addition of a few new articles. In carrying out this work the author has sought to improve classification and clear up confusion where this besets the subject matter dealt with. Influenza takes its proper place among the virus diseases. Splenic anæmia is divorced from Banti's disease, and the confusion attendant on the use of the terms tropical sore and tropical ulcer is

banished by the presentation of three entities under the names Desert Sore, Tropical Ulcer and Tropical Sloughing Phagedena. These are representative of much of the excellent reorganization the work has undergone. An interesting innovation in disease grouping is that of Reiter's disease, Felty's syndrome and Stevens-Johnson's disease under the parenthood of abacterial pyuria, useful for provisional integration in the present state of our knowledge.

The advances in medicine achieved in the course of the recent war are adequately represented. The view is expressed that phenol-preserved T.A.B. vaccine modifies the clinical course of enteric fever while the alcohol-preserved preparation does not do so. This is welcome, and will hearten those who have hesitated to accept the immunological view that the efficacy of the vaccine can be judged by reduction in mortality alone. In the next revision consideration might with advantage be given to the mention of the multiple pressure method of vaccination and the interpretation of its results.

Time lag between revision of text and publication has entailed lack of reference to some of the recent dramatic successes of antibiotic therapy, but the presentation of established fundamental knowledge required for the recognition, understanding and general management of the diseases described will readily ensure the maintenance of the position this work deservedly holds in medical literature.

J. B.

JOURNALS RECEIVED

THE following journals have been received and are available in the Library of the Royal Army Medical College.

<i>Vojno—Sanitetski Pregled</i>	November-December 1949
<i>Medical Press</i>	January 11, 1950
<i>Edinburgh Medical Journal</i>	October 1949
<i>Army Med. Services Magazine</i>	January 1950
<i>British Medical Journal</i>	January 7, 1950, and on
<i>St. Bartholomew's Hospital</i>	January 1950
<i>New Zealand Med. Journal and Supplement</i>	October 1949
<i>Medical Journal of Australia</i>	November 26, 1949
<i>Journal of the R.A.S.C.</i>	January 1950
<i>Journal of the Royal Egyptian Medical Association</i>	January 1950
<i>Lancet</i>	January 14, 1950
<i>B.M.J.</i>	January 14, 1950
<i>Jour. Royal Inst. Public Health</i>	January 1950
<i>Leprosy Review</i>	October 1949
<i>Medical Press</i>	January 20, 28, 1950
<i>Medical Journal of Australia</i>	December 3, 10, 1949
<i>Surg. Gynec. and Obs.</i>	January 1950
<i>South African Medical Journal</i>	January 1950
<i>Chronicle of World Health Org.</i>	December 1949
<i>Canadian Jour. of Public Health</i>	December 1949
<i>Report of the Med. Res. Council</i>	1945 - 1948
<i>Military Surgeon</i>	February 1950

Library of Congress Quarterly Acq.	November 1949
British Red Cross Quarterly Res.	January 1950
<i>Military Rev.</i>	January 1950
<i>Lancet</i>	Current number
<i>North Wing—Mag. of Sheffield Medical and Dental Schools</i>	January 1950
<i>Practitioner</i>	February 1950
<i>Edinburgh Medical Journal</i>	February 1950
<i>Medical Press</i>	Current number
<i>Royal Melbourne Hospital Clinical Reports</i>	Annual for 1949

EDITORIAL NOTICES

The Editor will be glad to receive original communications upon professional subjects, travel, personal experiences, etc.

Correspondence on matters of interest to the Corps, and articles of a non-scientific character, may be accepted for publication under a *nom de plume*.

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Communications in regard to editorial business should be addressed—"The Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, A.M.D.2, War Office, London, S.W.1."

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Communications in regard to subscriptions, change of address, etc., should be addressed "The Manager, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, A.M.D.1, War Office, London, S.W.1."

ADVERTISEMENTS

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MAJOR H. W. PECK, *R.A.M.C.*

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Journal of the Royal Army Medical Corps.

Original Communications

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY

BY

Lieutenant-Colonel J. M. MATHESON, M.D., M.R.C.P., F.R.C.S.Ed.

Royal Army Medical Corps

Medical Liaison Officer with the Surgeon-General, United States Army

WORLD WAR II gave many R.A.M.C. Officers the opportunity of meeting United States Army Medical Corps officers and of profiting by that friendly association and co-operation. As the years have passed many of those officers have returned to civilian life, or have retired, leaving a dwindling number preoccupied with peacetime duties thus dimming into pleasant reminiscence the rich possibilities of that wartime association. Those of us who have, since the war, been fortunate to have or to renew contact with the U.S. Army Medical Department will agree that it is a vigorous and stimulating experience. Our aims as doctors and Army officers and our basic Service problems are the same and yet our interpretations of them, our approach to, and solution of these problems are characteristically different. By studying these differences and learning more of each other's organization and activities we should be stimulated to exchange ideas in order to share what is best in both to the benefit of the soldier for whose health and medical care we are responsible.

The U.S. Army Medical Department had its beginning during the American Revolution when in 1775 the Colonial Congress created an army medical establishment (Garrison, 1922) which became a permanent organization in 1813. The organization has since grown in size and function, particularly during the present century when the United States Army swelled to unprecedented numbers to fight on the remote battlefronts of World War I and to deploy across the globe in World War II.

In its development the U.S. Army Medical Department has a proud record

of achievement and progress due to men such as Letterman, Hammond, Sternberg, Reed and Gorgas to quote only a few outstanding names.

Letterman, medical director of the Army of the Potomac during the Civil War, was a man of administrative genius who in 1862 introduced three fundamental improvements: the organization of a system of evacuation by horse-drawn transport exclusively for wounded, the reorganization of scales and distribution of medical supplies in the field, and the formation of mobile field hospitals to bridge the gap between front line and base. Hammond (Surgeon-General, 1862-64), an eminent physiologist and neurologist and one of the founders of American neurology, created the U.S. Army Medical Museum in 1862; Sternberg (Surgeon-General 1893-1902), a pioneer bacteriologist, established laboratories at military stations, founded the U.S. Army Medical School (1893) and created the Army Nursing Corps (1901). Sternberg's influence resulted in Walter Reed's demonstration of mosquito transmission in yellow fever (1900) which enabled Gorgas to eradicate, by mosquito control, the yellow fever scourge in Panama (1904-13).

Today the major policy and economy of the U.S. Army Medical Department is co-ordinated with that of the Navy and Air Force Medical Services under the Director of Medical Services of the Armed Forces of the United States. Headed by the Surgeon-General, Major-General R. W. Bliss, the Army Medical Department comprises the Medical Corps, Dental Corps, Army Nurse Corps, Medical Service Corps, Women's Medical Specialist Corps and also includes, unlike our own Medical Department, the Veterinary Corps. These components are made up of able men and women dedicated to the advancement of military and scientific medicine. Their enthusiasm is based not only on the tradition of past achievement but on the realization that the Army Medical Department is their individual concern. To do one's appointed task well and to improve oneself is not enough, every member is expected to contribute something by suggesting ideas to increase the efficiency of the Department. Every suggestion is examined and adopted if of value.

The way in which the U.S. Army Medical Department has met the challenge of the post-war problems of organization, man-power, training, specialization and research, makes a fascinating and stimulating story, and we are therefore fortunate to have the opportunity of having it told to us by some of the leading figures in the U.S. Army Medical Department.

Major-General George Ellis Armstrong, the author of the first article, is Deputy Surgeon-General of the United States Army, and in choosing to describe the relation of the U.S. Army with the civilian medical profession he has undertaken a task for which he is eminently qualified. A graduate of the University of Indiana, from which he received his A.B. degree in 1922 and M.D. in 1925, he lost no time in obtaining a regular commission in the U.S. Army Medical Corps. He passed with distinction through the Medical Field Service School and the Basic Course of the Army Medical School, and attended the Command and General Staff School. During his service in U.S.A.,

China and the Philippines he earned a high reputation as a surgeon of dexterity and sound judgment. World War II brought him administrative responsibility as Deputy Surgeon (A.D.M.S.), in 1944, of the China-Burma-India Theatre, and subsequently for two years as Surgeon (D.D.M.S.) of the China Theatre. His success in these appointments was due to his initiative and his ability as a diplomat. In 1946 he became Chief of the Personnel Division in the Office of the Surgeon-General in Washington, D.C., which brought him face to face with the grim task of rebuilding a peacetime medical service amid the headlong rush of demobilization. He was made Deputy Surgeon-General in 1947, and promoted in May 1949 to the two-star rank of temporary Major-General. He is an indefatigable worker, and his dynamic and genial personality inspires confidence and friendship in all who come in contact with him.

General Armstrong is well known in American civilian medical circles. An able speaker, he is to be found at most policy-making meetings of the leading medical bodies in whose deliberations he and the Surgeon-General both take part on behalf of the Army. Harassed by a medical man-power shortage, budget economy, and the demands of heavy commitments at home and abroad, General Armstrong combines with the Surgeon-General, General Bliss, to bring a clear insight and objective approach to bear on these problems. They have fought to have an Army Medical Service which will attract and keep good doctors by offering a planned military career with clinical opportunity parallel to the best available in civil life. This has been no easy task but despite the difficulties their efforts are bearing fruit for their sincerity of purpose has won for them the confidence and co-operation of the civilian medical profession.

REFERENCE

GARRISON, F. H. (1922) *The Military Surgeon*, 50, 600.

UNITED STATES ARMY AND THE CIVILIAN MEDICAL PROFESSION

BY

Major-General GEORGE E. ARMSTRONG

Deputy Surgeon-General, United States Army

PRIOR to World War II there was little contact between military and civilian medicine. The fault for this situation undoubtedly was not unilateral. Although civilian physicians played a major role in our medical service during World War I, following this conflict there was no attempt to keep up any appreciable rapport.

With the onset of World War II civilian medicine was again called upon and responded magnificently by sending to the Army about 45,000 physicians or approximately one-fourth of the nation's availabilities. (This figure does not include those physicians who entered the Naval Medical Service.) Among these thousands were a great many outstanding teachers and clinical specialists who became Army consultants or chiefs of professional services in military hospitals. Considering that the civilian physicians outnumbered the career military medical man by about fifty to one, the lion's share of the credit for the outstanding medical record made during World War II also must go to the civilian physicians.

At the termination of the recent hostilities, the Surgeon-General of the Army had sufficient vision to realize the importance of keeping military and civilian medicine "in the same stream" and with this in mind every effort has been made during the post-war period to keep old contacts and to make new ones that will result in attaining this goal. As a result of mutual effort and co-operation, the spirit of unity between military and civilian medicine is stronger today than at any time in our nation's history.

In order to understand how Army medical interests are integrated with our civilian professional brethren we might pause a moment and consider briefly the organizational framework of American medicine and how our liaison fits this structure. The basic organization is the American Medical Association. Every physician in the Army automatically becomes a "service fellow" in this organization, without payment of dues, and enjoys all the privileges of civilian membership. The Army has representation with vote in the American Medical Association House of Delegates which is the governing body of the organization. Numerous councils of the Association

have been and are most helpful in assisting the Army in the solution of many of its more serious problems. For example, the Council on Medical Education and Hospitals assisted us materially in the inauguration of our post-war professional training program and the Council on National Emergency Medical Service has been of great help in our efforts to produce physicians during the post-war period of acute medical personnel shortage. The attitude of the Association as a whole toward the military is extremely healthy, the general feeling being that military medical service is as much a responsibility of the Association as is furnishing medical service for the country's civilian population.



Major-General George E. Armstrong
Deputy Surgeon-General, United States Army

A request made recently by the three Armed Forces Surgeons-General to the American Medical Association for a Section on Military Medicine and Surgery within the framework of the Scientific Assembly of that organization has received most sympathetic consideration. At the last meeting of the American Medical Association the plan was tentatively approved and an opportunity will be given at the next annual meeting of the Association for the military to present a program on appropriate medico-military subjects (chiefly pertaining to post-war research and development) with a view to discovering the amount of interest which such a program will arouse among

the physicians of this country. We have every reason to believe that this "trial balloon" will receive an enthusiastic reception in which event a permanent place for military medicine and surgery in America's most powerful medical organization will be assured.

The medical schools of the United States and Canada constitute the Association of American Medical Colleges and the support currently furnished us by this organization closely parallels that of the American Medical Association. After all, the civilian medical schools represent our sole source of medical personnel and every effort is being made by the medical school staffs, particularly the deans, to see that their graduates are fully acquainted with the attractiveness of a military medical career. The interest of the medical schools in military medicine has increased considerably during the post World War II period because of the inauguration of our graduate professional training program. The Association of American Medical Colleges has invited the Surgeon-General to furnish a liaison representative to its Executive Council and thereby exists a most direct and intimate channel whereby the appropriate military medical problems can be brought directly to the attention of the medical school deans. There are many examples of the concrete assistance which the medical schools have given us in recent years but I will mention only a few. Today, 49 of our leading medical schools have Army Reserve Officer Training Corps units in which are enrolled more than five thousand medical students. The 49 Army medical officers who act as unit instructors are also participating in their respective school professional training programs either as residents or fellows. As a result of the attitude and the recommendations of the medical deans some 1,015 senior medical students applied for the 191 Army internships (plus 54 Air Force) for the year beginning July 1, 1950. The Association sponsored a program which caused many of their teaching personnel to volunteer for active participation either in our overseas consultant program or to take part in the actual task of routine hospital work during the past three years when our own clinical specialists have been developing.

The third great medical organization with which we have established a very close relationship is the American Hospital Association. Service medical administrators are strongly urged and encouraged to participate in all phases of this organization's activities. Army medical officers are currently acting as members of some of the Association's most important committees and councils. Although the type of assistance and co-operation rendered by the American Hospital Association is quite different from that of associations mentioned above, nevertheless, the helpful spirit is equal.

Many other medical organizations are today furnishing the Army with every possible aid. I would be remiss if I did not at least mention the fine contributions which have been and are being made by such groups as the American Specialty Boards, the American College of Surgeons and the American College of Physicians.

So much for the overall organizational structure of American medicine. Let us now see how the civilian physician is actively participating in military medicine.

Acting on the joint recommendations of both military and civilian medical groups, the Secretary of Defence recently has taken two notable actions—appointed a Medical Advisory Committee and established within the Department of Defense an Office of Medical Services. The former includes several of the country's more prominent physicians and dentists and advises the Secretary on military medical policies. The latter, with a civilian physician currently acting as Director, supervises policies, administration and operation of the medical services of the three Departments (Army, Navy and Air Force) and thus assures co-ordination in so far as is compatible with the departmental missions, correlations of effort, prevention of duplication and overlapping, and the attainment of the maximum economy in the utilization of funds, facilities, and medical man-power. Thus at the highest level of our defense structure, civilian physicians are not only wielding tremendous influence but also are accepting the major over-all responsibility for the operation of current military medical service and for the medical aspects of our future national defense planning.

Within the Army itself, the civilian medical profession has assumed an even more concrete assistance role. To augment the post-war shrunken Army Medical Corps, today we have approximately 1,000 full-time civilian reservists on voluntary active duty plus the equivalent of 500 man days (per average month) served by Reserve officers on short tours of duty ranging from one to thirty days, and 375 civilian physicians working full or part-time in military hospitals and dispensaries.

Initially to build up our full complement of clinical specialists and thereafter to replace those lost by normal attrition, the Army Medical Department some four years ago entered the field of "graduate medical education." Today nine of our large continental German Hospitals have been designated "teaching hospitals" and are giving a level of intern and resident training which compares favourably with the better civilian centres. This program, fully approved by the appropriate civilian agencies, would have been impossible unless some 800 of our leading civilian clinical specialists had not volunteered to visit these hospitals once or twice each week and conduct teaching ward rounds, supervise the work of the interns and residents, give didactic lectures and participate in clinical pathologic conferences. Their pride in the success of our professional training program equals our own and their enthusiasm for and their loyalty to our program equals that felt toward the civilian educational institutions with which most of them are connected.

Incidentally, the medical schools which are located near our "teaching hospitals" have warmly supported our program and generously shared their teaching staffs. Fortunately the Army has been able to reciprocate in part

and we now have 29 of our medical officers serving as part-time instructors in these same medical schools.

In addition to our "teaching consultants" some 148 of the same calibre make periodic visits to the smaller continental installations to assist the staffs in their professional problems, do a limited amount of teaching, and advise the Surgeon-General and his Area Surgeons as to the adequacy or inadequacy of the medical service being rendered.

Somewhat more spectacular has been our "overseas" consultant program whereby Army hospitals outside the continental limits of the United States are visited for two or three day periods each month by teams consisting basically of a general surgeon, an internist and a psychiatrist, augmented by one or more representatives of the other clinical specialties. In 1949, 91 highly qualified clinicians participated in this program which resulted in maintaining a much higher standard of medical service than would have otherwise been possible, to say nothing of the favourable effect on the morale of our overseas personnel.

Since World War II the Army Medical Department has for the first time in its history undertaken a military medical research and development program of broad scope and considerable magnitude. Approximately one-half (money-wise) of this program is being carried out under contract by civilian medical schools and outstanding individual investigators. That part pursued in our own laboratories and installations is considerably strengthened by several full-time civilian researchers plus a number of research consultants. It should be mentioned in this connexion that the National Research Council with its innumerable committees and panels advises us on the over-all program and is constantly available for the study of any special problems. Parenthetically it should also be noted that a Medical Sciences Committee of the Research and Development Board of the Defence Department (with members representing the Army, Navy, Air Force and civilian medical research) analyses and approves all programs to prevent duplication and assure soundness.

Few of the accomplishments discussed heretofore would have been possible without the immeasurable support given us by the Society of United States Medical Consultants in World War II. This organization came into being in the Fall of 1946 when 178 leaders in American medicine, who had served as medical consultants with the Armed Forces (principally with the Army) during World War II, voluntarily met, at their own expense, in Washington, D.C., and banded themselves together and offered their service to the Surgeon-General of the Army. This Society has furnished us with an Advisory Board which meets frequently with the Surgeon-General and his staff to discuss and advise on both policy and operational problems. Committees of the Society have helped our professional training program and inspected its progress: our consultant program; our personnel requirements; our Reserve problems; and assisted in procuring medical personnel. Members of the Society have

personally volunteered for all of our various consultant programs and have been instrumental in obtaining other qualified physicians to complete these quotas. It is safe to say that the Surgeon-General has embarked on no major venture within the past three years without discussing it with and obtaining the approval of representatives of this loyal, patriotic, and unselfish group. Their undiminishing enthusiasm, more than four years after the cessation of hostilities, is far more descriptive than any words which I might pen. I am sure that your Director-General, Lieutenant General Sir Neil Cantlie, who met with and addressed this Society at its Fourth Annual meeting, can attest my statements.

CONCLUSIONS

(1) The Army Medical Department is determined that military medicine will be integrated to the maximum possible extent with the best in civilian medicine.

(2) Organized medicine in the United States today considers military medicine as one of its constituent parts, recognizes its responsibilities in the conduct of the medical service of the Armed Forces, and is actively and sympathetically assisting in solving our problems and maintains a high degree of medical excellence.

(3) Without the active support rendered by civilian medical organizations and by individual civilian physicians the medical service of the Army today would not have reached its present state of excellence.

(4) It is our constant aim *never* again to let military medicine become *isolated* from the rest of American medicine.

ACCIDENT SURGERY

BY

Major P. ROSS WHEATLEY, D.S.O., M.B., F.R.C.S.

Surgical Specialist, Royal Army Medical Corps

UNTIL the late thirties the treatment of civilian accidents had been haphazard. The casualty departments of hospitals were rarely visited by the senior staff and the treatment of minor injuries and fractures was often left in the hands of juniors without adequate supervision. Preventable sepsis, wasted muscles and stiff joints were the cause of much chronic sickness and unemployment. When this wastage of man-power was realized an increasing interest was taken in the organization of the treatment of injuries. Fracture clinics began to be set up in the large teaching hospitals and special clinics in industrial centres. Senior surgeons took the responsibility not only of treating individuals, but of organizing and supervising treatment from the beginning and throughout the period of rehabilitation.

In Birmingham a hospital devoted entirely to the treatment of injuries was established in 1941. It occupies the buildings of the old Queen's Hospital and is known as the Birmingham Accident Hospital and Rehabilitation Centre. Serving a densely populated industrial area, a profusion of industrial, road and home accidents—in all 48,000 a year—provide excellent material for study and research.

This hospital has developed a far-reaching reputation which attracts many visitors from home and abroad, and a visit to it is a stimulating experience. The enthusiasm of the staff, the smooth running of the organization and the multitude of new ideas and methods inspire one to study some of the many problems in this field of surgery. Having had the privilege of a three months' attachment to this hospital the writer thinks that an account of the organization and some of the methods of treatment used would be of general interest in the Corps.

THE ORGANIZATION OF THE HOSPITAL

As in any hospital there are, of course, two sides to the organization—the clinical side dealing with the diagnosis, treatment and rehabilitation of the patients, and the lay administrative side which provides for the day-to-day needs of the institution. The one is headed by a Clinical Director, who acts as a consultant to the surgeons and directs the clinical policy and clinical research, the other by the Secretary. The closest co-operation exists between

the two. Under the control of the Secretary, but vital to the working of the accident service, are the secretarial staff and the resettlement staff. There are three surgical teams and a separate burns unit. The surgical team consists of two surgeons, an anaesthetist, a registrar, two house surgeons, together with its own almoner and clinical secretaries.

The hospital is small if judged by the number of beds (180 surgical and 30 burns unit) but there is a rapid turn-over of in-patients. The total number of patients treated is large—between 600 and 800 attend out-patients every day. A really efficient organization is necessary to ensure that each patient attends the right clinic at the right time and that complete and easily readable notes and X-rays are produced at the same time as the patient. All out-patients are seen by appointment, the date and time of which are clearly marked on attendance cards.

A case sheet and a folder are issued for each new patient at Reception, where the usual particulars are taken and recorded. Written clinical notes are made on the case sheet when the patient is first seen, but they are subsequently typed out with copy to the patient's own doctor or Works Surgery if a note has been sent by either of these. All subsequent notes in wards and out-patients are dictated to the clinical secretaries for typing. Each surgeon has his own secretary and one is allotted to the Registrars' and House Surgeons' Clinics. Without them it would be impossible for the surgeons to treat the large numbers of patients and to make adequate notes on them.

The Casualty Department is the key to the whole organization. Here the patient receives his first impression of the hospital. An impression of efficiency ensures his co-operation, a most important factor in his rehabilitation. Here, too, the diagnosis is made and treatment is started. This initial treatment is all important and can make or mar the success of early restoration of function. It is at this time that infection can be prevented, that fractures can be reduced easily, that early physiotherapy can be started. In fact it is the time when a plan of treatment should be made, a plan which takes into account the patient's intelligence, his moral stamina, his physique, his age and his occupation, and is designed to get him back to work as quickly as possible. For this reason a member of the senior staff is always available in Casualty to give advice where required in the case of minor injuries and to initiate the treatment of major ones.

In the organization of a casualty department dealing with up to 200 patients a day, plenty of space and adequate staff are essential. Patients are examined in cubicles which allow the Medical Officer to move quickly from one to the other. Face masks are worn when inspecting any wound and mobile trolleys carry sterile forceps and dressings for the temporary covering of wounds. When examined, walking patients move on to other cubicles for treatment. There is a separate X-ray Department in Casualty giving a twenty-four hour service. The wet films are seen as soon as they are developed. At the end of the day all the films are reviewed by the surgeon on duty, who can decide if any fractures have been missed and also get a general impression of the day's work.

In the same way all the films taken of in-patients and clinic out-patients are reviewed daily by the Clinical Director.

Shocked cases are admitted to a separate shock-room and are seen by the anaesthetist on duty who institutes and supervises the treatment of the shock. Blood grouping and cross-matching with stored blood is done at once and transfusion started. Plasma is rarely used outside the burns unit. A second surgical team is available to take over time-consuming cases during the busy hours of the day.

Attached to the casualty department is a ward of 26 beds where cases may be detained up to forty-eight hours. All minor cases for operation under general anaesthesia are admitted to this ward for pre-operative and post-operative care and are allowed home when they come round from the anaesthetic. Cases of concussion are detained here for observation for forty-eight hours.

THE BURNS UNIT

All burns are treated from the time they are first seen in casualty by a separate unit which is run in conjunction with the Medical Research Council. The first Research Director of the unit was Dr. Leonard Colebrook and the results of treatment are a remarkable tribute to his work on the prevention of spread of infection.

The burn is regarded as an open wound which in the first six hours is almost always sterile, but which, because of its large area, is particularly liable to infection. The main problem after the treatment of shock is the prevention of cross-infection of the wound which, as is now well known, is particularly liable to take place in the wards and dressing rooms of a hospital. This problem has been tackled by a "fourfold attack" (Colebrook *et al.*, 1948):

- (1) Special precautions to prevent infection at the time of dressing.
- (2) Sealing of the wound by "perfect cover dressing" and other measures to prevent infection in the ward.
- (3) Elimination of pathogens by penicillin.
- (4) Reduction of raw surfaces by early skin grafting.

It is worth while considering the routine treatment of the various types of burns in some detail to see how these principles are applied from the time the new case is seen by the House Surgeon of the unit in casualty.

He must first recognize if the case is shocked or is liable to develop shock. Emphasis is placed on the prevention of shock rather than allowing it to become established. Any child with a burn of 10 per cent of its body area or an adult with 15 per cent or over is regarded as a potential "shock" case, and is admitted immediately to the special burns unit shock-room. Here the patient is undressed and placed between clean sheets and an intravenous infusion of plasma is started at once. The rate at which the plasma should be given is worked out from estimations of the hæmo-concentration which are made hourly during the initial stages of the treatment. The infusion is continued until the hæmo-concentration is restored to normal and is stable. This usually takes

twenty-four to thirty-six hours. Until this has occurred no interference with the patient to apply dressings is allowed.

The burns are classified as :

- (1) "Erythema," which fades within a few days.
- (2) Superficial "Partial Skin Loss" (p.s.l.) which heals in a week.
- (3) Deep "Partial Skin Loss" (p.s.l.) which spares the deeper parts of the hair follicles and sweat glands and will heal in two to four weeks.
- (4) "Whole Skin Loss" (w.s.l.) with destruction of all epithelial elements and usually requires grafting if over 2 cm. in diameter.

The clinical distinction between deep p.s.l. and w.s.l. is not easy and tests of capillary circulation are unreliable. Usually judgment is made on a combination of the history of the burn and the sensitivity of the burned area to pin-prick.

The ideal treatment for a burn of w.s.l. is immediate excision and split skin grafting and this is carried out whenever possible, especially when the area of w.s.l. has definite limits or when it is over a joint where scarring would limit movement. The operation is simple to perform and gives a short cut to restoration of full function. If there is a doubt as to the diagnosis of w.s.l. or if the patient is unfit for immediate operation the burn is treated conservatively for two to three weeks by which time the areas of w.s.l. become apparent and can be stripped of slough and granulations and grafted.

Minor burns are dressed in casualty and seen again in an out-patient clinic seven days later with the dressing untouched. Cases for admission are sent to a clean room set apart for them, where they are undressed and put to bed between clean sheets only before going to the dressing room. There swabs are taken of the nose, the throat, and the burnt area itself.

All dressings are carried out with strict aseptic technique. Anæsthesia is never necessary and sedation only occasionally. The burn and surrounding skin are thoroughly cleaned with Cetavlon 1 per cent. Blisters are left intact and no epithelium is removed. Penicillin cream, 400 units to the gramme in Lanette wax base, is then smeared over the whole burn. The "perfect cover" is then applied as follows :

A gauze dressing is placed on the burn to overlap the penicillin cream in all directions. A thick layer of absorbent cotton-wool is then put on to overlap the gauze and finally several layers of crepe bandage are firmly applied so that all the wool is covered completely.

If the dressing remains dry it forms a complete barrier to organisms, but if the wool becomes soaked with exudate it forms a culture medium and gives access to the wound for contaminating organisms. This ideal cover is practical in all sites except the face and buttocks. Around these areas a narrow margin of gauze is left exposed. When burns of these areas cannot be covered they are treated daily with penicillin spray (500 units per m.l.). When there is a danger of the dressing being pulled off or interfered with it is covered with plaster of Paris bandages. This is frequently necessary with children.

After the initial dressing all subsequent ones are carried out in a special

air-conditioned room in which a constant stream of filtered air from the roof carries airborne bacteria downwards towards the floor and out beneath the door. Back currents are prevented by an airlock room outside the dressing room. An interval of five minutes between cases ensures a complete replacement by clean air. By employing careful aseptic technique in the dressing room cross-infection during dressings has been completely eliminated. It is estimated that by avoiding infection the average stay in hospital is reduced by at least ten days, so that the cost of the ventilation plant is soon repaid by the saving of occupied beds.

In the wards every effort is made to limit cross-infection by ventilation, the use of cubicles, the oiling of blankets and floors and by maintaining as far as possible perfect cover to the burns. In spite of this a certain amount of cross-infection occurs. Infection with hæmolytic streptococci is not common (during 1945-47 it was 5.4 per cent), since it is controlled by the penicillin in the dressing, but infections with *B. pyocyaneus* (8 per cent) and *B. proteus* (12 per cent) are more common. Fortunately these latter infections are not so serious, for although difficult to control they rarely give rise to serious systemic effects, nor do they greatly interfere with healing or skin grafting as does the streptococcus.

Reduction of raw surfaces is the fourth line of attack against infection. As mentioned above, w.s.l. burns are excised and grafted on admission whenever possible. Where this is not possible due to lack of definition or to uncertainty of diagnosis, delayed grafting of w.s.l. areas is carried out. The optimum time for doing this is between the fourteenth and twenty-first day. At this time the granulation tissue and slough can be stripped off in one layer by blunt dissection with scissors (Dallas Ross, 1949). The bed bleeds freely by a capillary ooze which is completely controlled by pressure with hot packs in a few minutes. This bed is ideal for grafting and has a minimum of fibrosis to interfere with functional recovery. If grafting is delayed more than three weeks the granulations need excision by a knife and the bleeding may be uncontrollable. The thickness of the solid fibrous tissue bed which will cause scarring and will limit function is directly proportional to the length of time of the delay. This stripping of granulation tissue over a large area can cause considerable shock and loss of blood, especially in children, and a blood transfusion is given during the operation for areas over 3 to 4 per cent. As much of the raw area as possible, consistent with the general condition of the patient, is covered at the first operation and the remainder is grafted a week or so later.

There are three possible causes of failure of a graft to take: (a) hæmorrhage under the graft; (b) lack of fixation; and (c) the presence of streptococcal infection. The first two are due to faulty technique in the operation. Streptococcal infection if present should be controlled with parenteral penicillin.

The reduction of raw surface by grafting causes a remarkable improvement in the general condition of the patient. In young children, who would other-

wise die of toxæmia and protein loss, the grafting is a life-saving procedure. Again, as has been mentioned already, early grafting prevents the formation of fibrous tissue and allows early return to full function. The following case-history illustrates the stages and result of early, though not immediate, grafting:



FIG. 1.—Severe burn of back.



FIG. 2.—The same burn 18 days later.

B. R., aged 6½, was admitted under Mr. Dallas Ross on 29.11.47 half an hour after his clothes had caught fire from a gas stove. He was taken immediately to the shock-room and treated with plasma infusion. The plenary dressing was carried out five hours later. He had an extensive burn of the back which covered an estimated 16 per cent of the body area. Of this it was thought that 10 per cent of the body area was deep burn (fig. 1, p. 175).



FIG. 3.—The slough and granulations have been stripped. The area is now ready for grafting.



FIG. 4.—Split skin grafts have been applied.

On 17.12.47 the edges for one inch around had healed and the remainder was w.s.l. covered with separating slough and collagen (fig. 2). The sloughs were removed, leaving a clean area ready for grafting (fig. 3). Postage-stamp grafts were applied to the whole area (fig. 4). Transfusion was given during the operation. Perfect cover dressing was applied and enclosed in plaster to prevent interference (fig. 5).

On 5.1.48 all grafts had coalesced and the healing was complete. This was the thirty-seventh day (fig. 6).



FIG. 5.—The perfect cover dressing enclosed in plaster.



FIG. 6.—The burn completely healed on the 37th day.

THE TREATMENT OF THE OPEN WOUND

The policy in the Birmingham Accident Hospital in regard to the treatment of recent wounds is that they should be cleaned, excised and closed. It is believed that after an early and thorough excision of a wound any sepsis which follows is usually caused, not by bacteria instilled at the time of wound-

ing, but by those added afterwards, particularly in hospital wards. A wound which is left open discharges serum which soaks through the dressings and plaster and becomes a culture medium for organisms. Infection is then certain, healing is delayed and resulting fibrosis leads to loss of function. On the other hand a wound which is thoroughly cleaned and from which dirt and damaged tissues are removed and which is then closed by sutures or by skin grafting will heal without infection in the vast majority of cases. The natural defences of the body aided if necessary by antibiotics can deal with any pathogens which have escaped the initial cleansing. The closure by skin cover prevents secondary infection. The absence of infection allows healing without fibrosis and an early restoration of function.

If this should seem to contradict our experience of wounds in war, we must remember the special circumstances which then prevailed—the frequent extensive destruction of tissues by H.E., the gross contamination of the wounds and the necessity for evacuation with the danger of lack of supervision which that entailed. Even in war delayed primary suture after five days became the established routine. In ideal conditions those same wounds might have been successfully closed at once.

Although immediate closure is the general policy those who practise it stress the importance of a thorough exploration and cleansing of the wound and the excision of all damaged tissues. They allow, too, that there are exceptions in the case of grossly contaminated wounds, and of wounds with extensive muscle damage, in which the delay of primary suture is necessary. While advocating the general acceptance of the principle of immediate closure they do not deny that in cases of doubt or where skilled supervision is not available or where the surgeon is inexperienced, delayed primary closure may be preferable.

In the casualty department all minor lacerations are thoroughly cleansed with Cetavlon, explored under local anæsthesia and sutured with fine thread. Major lacerations and compound fractures are admitted for operation under general anæsthesia. After thorough cleansing and excision these wounds are sutured if this can be done without tension. If this is not possible immediate cover is obtained with split skin graft in most cases even if it is clear that some more elaborate plastic procedure will be necessary later. The important thing is to obtain healing without infection and without fibrosis. Where tendons without paratenon, cartilage, or cortical bone are exposed, split skin grafting is unsuitable and then the application of skin flaps is used as a primary procedure to close the wound.

(To be concluded)

A VISIT TO THE NORTH AMERICAN CONTINENT

Being an Account of a Visit to Mexico, U.S.A. and Canada by the
Director-General Army Medical Services

BY

Lieutenant-General Sir NEIL CANTLIE, *K.B.E., C.B., M.C., M.B.,
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My trip to America was primarily made to attend the Twelfth Congress of the International Committee of Military Medicine and Pharmacy. These congresses are held biannually and nearly 30 nations are members of the organization.

At the invitation of the Mexican Government the meeting was held this year in Mexico City and I made my way there by air after arrival in New York on the *Queen Elizabeth*.

We left Washington Air Port by M.A.T.S. plane and our load was an international one. There were on board two United States Directors-General, Surgeon-General Bliss of the Army, and Rear-Admiral Swanson of the Navy, also Major-General Armstrong of the newly constituted Medical Corps of the American Air Force, the Air Force has been instituted with personnel provided from both the Medical Corps of the Army and of the Navy. It has as yet no military hospitals of its own. Then there was Surgeon Captain Graaf of the Royal Navy and Wing Commander J. H. Neal of the Royal Air Force Medical Services, as well as Lieutenant-Colonel Meneces, the Reader in Tropical Medicine at the R.A.M. College and Lieutenant-Colonel Matheson, our liaison officer in the States. Brigadier Coke, Director-General of the Army Medical Services of Canada, was in the plane with his liaison officer, Lieutenant-Colonel Costin, who many of us will remember was our Canadian liaison officer in London about two years ago. We had several other European delegates—Brigadier-General Meule, the D.G. of the Swiss Army, Major-General Lindsjo, the D.G. of the Swedish Army, Major-General Hienonen, the D.G. of the Finnish Army and others.

We flew south and west over the States of Virginia, North Carolina, Georgia and Alabama and along the southern edge of the great Smoky Mountains. From the air it struck me how much of the country was wooded. At length we reached the Gulf of Mexico, turned westwards, and soon saw the hazy outline of New Orleans in the distance, crossed the Mississippi River, and the flat coastline of Louisiana, and came at last to Texas, the biggest and some

say the most progressive state in the Union. My idea of Texas was rudely shattered when we flew over flat irrigated land which was growing rice. There were oil derricks to be seen as one would expect but the rolling hills and ranges of the Lone Star State of my imagination were certainly invisible from the air.

We landed at Randolph air field, near San Antonio, and although it was a hot and sticky Saturday evening we were met by Brigadier-General Otis Benson, Medical Corps U.S.A.F., who led us immediately in a fleet of waiting cars to the School of Aviation Medicine. Within a few minutes we were seated at small desks and were being initiated into the work of the School. What interested me most were the extensive research problems being undertaken. We were taken on a tour of these research establishments, and in spite of the fact that it was five o'clock on a Saturday afternoon the staff of research workers, including several Germans, were there to show us the different problems which were being studied. The ones I remember included landing on air fields in fog, and visual landing signs. The scope of research and the first-class equipment which was available was very striking. There was a Royal Air Force liaison medical officer here.

The scope of research, both in the Army, Navy and Air Force was brought to my notice very forcibly during my tour. Each Service had many civilian research workers who were fully occupied on many different projects. The amount of money spent in this way was obviously considerable.

By the time we had finished it was getting dark, and we were taken to the Officers' Club and received our first introduction to American hospitality at a cocktail party which was held in one of the well-furnished guest houses. The buildings here are in the Spanish style with tiled roofs and verandahs with attractive lawns and shrubs, and there appeared to be no lack of married quarters for officers.

We sat down to dinner in due course at the Officers' Club—about 50 strong—and we had a dinner which I shall long remember, chiefly because of the enormous steak which we were asked to eat. It was without exaggeration a month's ration, and although I tackled it with gusto I found that its size defeated me. I believe only two out of the diners finished it. As is the custom in the States during dinner we drank iced water. It was a cheerful and memorable evening, and our first introduction to many such occasions. I met for the first time Admiral Joel T. Boone who became a firm friend before I left the States. Admiral Boone had been for seven years the Medical Officer to five different Presidents of the United States, and had lived in the White House for that time. Admiral Boone was now holding the appointment of Medical Adviser to the Medical Department of the Secretary of Defence and I will have a good deal to say about him later on. We were a merry party when we broke up and went to see the dance which was going on, but it was not long before we were whisked away in cars and driven to San Antonio where we were put up for the night at the Officers' Club. I then discovered

my bag had been left at a different hotel and so went pyjamaless to bed and next morning the Red Cross came to my rescue with razor and toothbrush.

Soon after taking the air we crossed the Mexican border at the Rio Grande river. The centre of Mexico is a plateau which rises to a height of 7,500 feet, and we passed over rocky ranges with a good deal of parched-looking country, with small cultivated fields in the ravines. As we landed at Mexico City we saw snow-capped mountains in the distance of which one is the well-known Popocatepetl and another called the Sleeping Lady.

We were met on arrival by the first Secretary of the British Embassy and were quickly taken in charge by Major Garcia, a Mexican medical officer, who was deputed to look after us and act as our guide, philosopher and friend.

I was accommodated with other members of the British Delegation in a very modern hotel for which the charge for my room alone was 45s. a day (until I changed it), so it will be seen that Mexican hotels are not cheap, and in fact since the motor road has been opened from the States, the prices in the hotels have risen until they correspond with those in the United States.

Mexico City itself is largely modern and one might be in any western city, with 15 fine shady avenues and parks. The early town was surrounded by a marsh which perhaps those who have read the conquest of Mexico may remember, because Cortez, the Spanish conquistador, had to fight his way out of the city to escape from the Indians, and in so doing forced his way along a causeway which at that time joined the city to the surrounding country. That the marsh did exist is proved by the fact that the Palace of Fine Arts has sunk 3 metres into the ground. Luckily it has sunk evenly so that it is still intact, and was the setting for the opening and closing sessions of the congress.

On the afternoon of our arrival we were entertained to an alfresco luncheon, which was held at a millionaire's house with a lovely garden with many flowers and shrubs. I was told that his fortune had been made from patent medicines and that he was a great supporter of the Mexican Medical Corps, to which he had presented many articles of medical equipment. As we sat at table in this delightful garden I met many more of our fellow delegates and amongst them Major-General Thapa of India who is D.D.M.S. Southern Command at Poona and known to many officers of the Corps. There were Mexicans and their wives and it was pleasant to pass a couple of hours in the sunny garden eating and drinking. We had Mexican food and one course consisted of chupatties wrapped round pork crackling and flavoured with chillies. This and the next dish of highly flavoured dried fish was not nearly as good as the good roast turkey which came after.

Our next port of call was at the bull fight. Bull fighting is very popular and I was told that the bull ring in Mexico City is the biggest in the world. Be that as it may, we found our way, under Major Garcia's direction, to the entrance where luckily the Director-General of the Mexican Army Medical Corps, Brigadier-General Ramero, was just going in. We bowed to each other

but as his only language was Spanish our conversation was, I am afraid, limited to "buono" and "grazia." I managed to find a seat, however, and with Captain Graaf spent the next two hours watching my first bull fight. I will not go into details but I found when the fifth bull had been killed it tended to become monotonous, and as the matadors were novices, many only managed to kill their bulls after several gory attempts. The clumsy matadors were greeted with whistles and a cascade of cushions and hats flung into the bull ring, whereas those who pleased the crowd were cheered with shouts of "ollé." We came away before the end and thereby missed quite a usual fracas, so I was told, when one of the onlookers pulled out a revolver and stunned a neighbour by hitting him on the head.

The opening session of the Congress was held in the Palace of Fine Arts and was presided over by the Minister for Defence. The heads of delegations sat on the stage and there was a succession of welcoming speeches made by this Minister, the Director-General of the Mexican Medical Services and Brigadier Meule, the retiring President of the Eleventh Congress, the charming and popular Director-General of the Swiss Medical Services. These harmonious proceedings and the reading of the various speeches were seriously interfered with by a habit which, although common to Mexico, was unusual to most of us. This was the attendance of a swarm of photographers who proceeded to photograph all and sundry. They had stalwart assistants who bore aloft vast electric lights to blind everyone to the best of their ability and the flashing of bulbs and the clicking of cameras proceeded uninterruptedly throughout the whole session.

An official luncheon followed and as it was timed for one o'clock the delegates assembled just before that hour and proceeded to satisfy the thirst which the bright sunshine and the dust of Mexico City had caused. There is a local custom which is inclined to pay little attention to such matters as punctuality. Therefore to those who were unacquainted with this it was a little surprising when the official who was to be our host made his appearance at twenty minutes past two. We had a most excellent lunch and made our way very belatedly to the first session at the military hospital, where of course those unlucky members who had not been summoned to luncheon had been waiting for the best part of an hour. However, we finally got under way.

All the meetings were held in the military hospital, which is the largest and most modern hospital in Mexico City. The military medical service has its own medical school where cadets graduate as doctors, and are then commissioned in the medical service.

The hospital accommodates about 1,000 patients and is the only military hospital in the whole of Mexico. All serious cases in the country are therefore sent here for operation and treatment, and selected cases from civilian hospitals are transferred on demand and are used for teaching purposes. Medical officers are allowed private practice and spend only about 50 per cent of their time

on military duties. Their pay from Army sources was, I was told, only about one-third of what their standard of living demanded.

The sessions of the Congress were inclined to be lengthy because it was necessary to have all the papers and discussions in three languages—English, French and Spanish. The chairman of the various sessions had at times a very difficult task to stop the full flow of Latin volubility at the height of its course in order to demand a translation for the benefit of the listeners.

The best paper was undoubtedly that which was devoted to the study of air evacuation of casualties. This subject was presented by Great Britain and the United States and on our side the speakers were Lieutenant-Colonel Meneces, who gave an excellent paper illustrated with lantern slides, and Wing Commander Neal of the R.A.F. Medical Services. This was also the best attended session of the Congress.

One day we were honoured by being received by the President of Mexico, President Aleman, and before being ushered into his presence, we had ample opportunity of a study of the comings and goings of all classes who seemed to have access to the President or his satellites.

One of the most memorable occasions was a reception by the Mayor of Mexico City. The Mayor himself was absent because he was that morning attending the funeral of some firemen who had been killed in a street accident on their way to a fire. I was interested as to why the Mayor should go personally to the funeral of the firemen and I was told the reason was that everyone admired firemen because they had a high reputation for integrity and that any tragic or other occasion was attended by the mayor in person. In his place we had the deputy mayor.

We assembled for this function in an attractive old chamber in what had been the Spanish Governor's palace. There were fine portraits, beautiful carved chairs and furnishings. An orchestra played lively airs and at intervals there were songs rendered by some magnificent opera singers. The heads of delegations were called forward in turn and presented with a medal and a scroll appointing them a "Visitante Distinguido" of Mexico City.

As I was emerging after the ceremony the harmony of these proceedings was abruptly broken by the Secretary-General who earnestly asked me for my assistance, and going back I found one of the heads of the delegations of one of the Latin countries much incensed because his name had not been included in the recipients for a medal and scroll, he looked upon this as an insult to his country and threatened to leave the Congress. I did my best to soothe matters by telling him there would be a further presentation of medals on a later date and he eventually calmed down.

I remember a charming reception which was given for us at the Ministry of External Affairs in a very handsome salon with green marble pillars. The Deputy Minister told me that the green pillars were of malachite and had been presented by the Emperor of Russia to the Emperor Maximilian. After Maximilian had been shot during the revolution the pillars were brought to

the Ministry and re-erected. We met here many members of the Diplomatic Corps, and of particular interest to the British delegation was our introduction to the British Ambassador and Mrs. Rapp and the Canadian Ambassador and Mrs. Hebert.

On another afternoon we were taken to a rodeo, and most of us enjoyed it much more than the bull fight. Here we saw steers thrown by riders on horse-back, riders on bucking bronchos, lassoing, and Mexican dancing. The whole display was given by amateurs and was excellent. It must be remembered that the Mexican horsemen are among the best in the world, and won the chief events on horseback at the Olympic Games in 1948.

One day for luncheon we were taken out about 15 miles on an excursion to the temples of the sun and the moon built by the Aztecs. Luncheon was served in a huge underground grotto and we sampled native dishes of food and wine. We had tortillas, which are really chupatties. We had lamb (or was it goat?) which had been cooked on hot stones covered with earth, and we had dark purple bean hash. For drink we had pulque, which is brewed from the stem of the cactus plant, and a kind of brandy, *taquila*, which is by account the morning drink of the Mexican peasant! Another evening before dinner a reception for us was held at the Officers' Club where we sat out in a patio and saw an exhibition of old tribal Mexican costumes and dancing to the accompaniment of much music from several different guitar bands and many rounds of drinks. The ladies came to this in large numbers although they generally sat at different tables to the men. The colour and variety of the costumes, the music and dancing made this one of the most attractive and memorable of all our evenings.

So the week passed with morning and afternoon sessions at the hospital and a pleasant variety of entertainment. There was a closing banquet attended by many medical officers and many officials headed by the Minister of Defence.

There were speeches by General Jame, the Director-General of the French Army who is the President elect for the XIV Congress in Paris in 1951, and by Brigadier-General Meule, the President of the XII Congress held in Switzerland in 1947.

I was also asked to speak on behalf of the British, American and Canadian delegations. A dance followed and our pleasant evening ended by a visit to the very hospitable American delegation which continued until a late hour.

President Aleman himself presided at the closing session of the Congress and again we had fine music and many speeches, the Presidential Guard on parade in blue uniforms and the inevitable photographers lurking this time more in the background.

I must mention the luncheon given by the British Ambassador for the British, Canadian and Indian delegations and the cocktail party given by the Canadian Ambassador. These were delightful occasions tempered with our embarrassment in arriving for the luncheons true to local fashion nearly an hour and a half late, because we were being received by the President.

So we came away the victims of Mexican goodwill and generous hospitality with a feeling that the meeting of so many nations and the papers and discussions had made our visit to the Congress and to Mexico instructive and enjoyable.

President Aleman had very kindly put his own plane at the disposal of any of the delegates who wanted to visit Acapulco, one of the pleasure resorts on the Pacific coast, and several had taken advantage of this wonderful offer, so we were fewer in number as we flew back next morning to Washington. At San Antonio where we landed to refuel, Lieutenant-Colonel Meneces and Matheson left the plane to visit the U.S. Medical Corps Depot at Fort Sam Houston, and thence to embark on a lecture and visiting tour to the universities at New Orleans, Memphis, Tennessee.

On November 1, with Brigadier Coke, Director-General of the Canadian Medical Services, my wife and I left for Canada. Travelling over-night from Washington by train we arrived at Montreal at 7 o'clock on a very cold morning. As I had only left Mexico City forty-eight hours before and had on good advice (as I thought) left my great coat behind me in Washington, I felt the change of climate.

We were met at the station by reporters and photographers, and we had hardly arrived at our hotel when I was again interviewed, and my views on the use of the atomic bomb duly accorded. After a night in the train and without breakfast one's views at this hour were inclined to be especially gloomy.

In Montreal I had my first contacts with the Canadian R.A.M.C., and after a visit to the G.O.C. Quebec District I was shown over the Veterans' Hospital. This is a large hospital chiefly for ex-service men who by military service are entitled to free medical treatment for the rest of their lives. The hospital staff included a quota of the regular C.R.A.M.C., and the medical and nursing officers and other ranks worked in with the civil staff. I was impressed by the excellent training and wide experience which the C.R.A.M.C. officers were able to obtain by this scheme, because of course they were sharing in the treatment of patients of all ages. A special feature I was shown was the treatment of poliomyelitis cases by balneotherapy and the most up-to-date equipment had been installed.

I lunched at the Mount Royal Club with Dr. James, the principal of McGill. Dr. Fraser, professor of obstetrics, and Dr. Duff, the dean. It is the most famous club in Montreal and amongst its founders were Lord Strathcona and Lord Mount Stephen.

I went to McGill University on a courtesy visit and was interested in the Osler Library where Sir William Osler's private collection of books is kept. It contained every copy of Browne's *Religio Medici* which Osler could acquire. I was also flattered by the librarian producing the copy of a book which I had once written and asking me to sign it. Talking of books, I met Lord Wavell during my visit, and watched him autograph "Other Men's Flowers."

A visit to the French Canadian University, the University of Montreal, was

also interesting because of its contrast to McGill. It is a new building of the most modern design and I remember its great hall, where the graduation ceremonies occur struck me because of its vast size and shape.

The principal of the university was an abbé and the chancellor was the Archbishop of Montreal. It emphasized the control which the Roman Catholic Church exercises over the life and education of the young French Canadian, and one notices the French Canadian influence everywhere in Montreal by the bilingual character of the city, where all shop signs, advertisements and regulations are in both English and French.

My wife and I attended an enjoyable cocktail party at the C.R.A.M.C. Armoury that evening when a pipe band enlivened the proceedings. I met a great many friends, amongst them Major-General Fenwick, a late director-general, and others, well known to many of the Corps. The desire to talk about old times and the many friendly inquiries which were made about our own officers showed the great interest and affection which they feel. I talked to so many that it is impossible for me to remember their names.

My next port of call was at Ottawa and here next day I was entertained to luncheon by the Honourable Mr. Claxton, Canadian Minister of Defence. This luncheon was held in the Bideau Club, and about 20 officers were present. They included Major-General McCusker, whom many will remember. Brigadier Snow, acting adjutant-general, Surgeon-Captain MacAllum, director-general of the Canadian Naval Medical Service, the director-general of the Royal Canadian Air Force Medical Service, officers from Brigadier Coke's Headquarters, amongst them Lieutenant-Colonel Crawford whom I had met previously at the Red Cross Conference at Stockholm in 1948. I remember we had an excellent luncheon which began with oysters and finished up with a very pleasant speech by the Minister of Defence extending me a warm welcome to Canada. In my reply I thanked him on behalf of the Corps and indicated in a few words our problems and expectations.

After luncheon I was taken in hand by Brigadier Thubron, the senior British Liaison Officer, and we called upon the Governor-General. Field-Marshal Alexander himself was away. A tour round the city included the Ottawa River where I saw huge rafts of logs floating down the river and being towed away to the pulp mills. The vast forests on the northern bank of the river which is in the province of Quebec stretched away into the distance, and one realised suddenly how huge is Canada and how small the cultivated area.

I visited the Canadian Medical Stores, which is equivalent to our depot at Ludgershall and found it excellently organized and staffed by keen and competent officers.

That evening I was entertained to dinner by Brigadier and Mrs. Coke in their flat, and we had a most enjoyable knife and fork supper of turkey, ice cream and other good things. I met all the officers in the Canadian Army Medical Directorate as well as British officers stationed in Ottawa. I slept in the Chateau Laurier Hotel, surely one of the largest and finest in the Commonwealth.

The next day we motored to Hamilton situated on the shores of Lake Ontario. Hamilton was originally chosen as the capital of Canada, but this was changed when, following the fighting between ourselves and the Americans, it was decided to move the capital to Ottawa.

At Hamilton I visited the Canadian Defence College, the Staff College and the Royal Military College; all of them the equivalent of the similar institutions in this country. In the Royal Military College the cadets spend four years, as compared with less than two years at Sandhurst. The first two years is taken up by a general education in physics, chemistry and the basic sciences.

Hamilton is interesting historically because on the site of the Staff College, Fort Frontenac, one of the first forts of upper Canada, was originally constructed. In the dockyards ships were built and then fought in battles on the lake. One of the ships built here was larger than Nelson's *Victory*.

I attended at the Staff College a demonstration which was being given by a team from the Combined Ops School at Fremington. There were two C.R.A.M.C. officers attending the Staff College Course, and one of them, Lieutenant-Colonel McCannell, came over later to our Medical Britannia Exercise in December. I had a busy day here which included a visit to the local hospital and finished up with watching an ice hockey match, graced by the first snow of the winter.

By next morning the snow was quite thick as we left for Toronto and motored along the northern shores of Lake Ontario. The country is closely cultivated and there are many good farms and villages. Near Toronto fruit farms predominate growing peaches, apricots, grapes and apples. The Canadian apples we eat in this country come largely from this part.

We reached Toronto about midday and put up at the Royal York Hotel, which is, I am told, the biggest hotel in the British Commonwealth. It was crowded, because it was the day of the football match between McGill and Toronto Universities, and in the bright cold clear air my wife and I enjoyed watching our first game of Canadian football. It is played by the padded and helmeted players we are familiar with. The ball is taken forward in a series of rushes which attempt to cover 10 yards of ground, and in this way the team works itself up the field until a score can take place, rather similar to a Rugby try. The game was enlivened by the opposing bands and the cheer leaders. There were two student bands which played at the same time and all the time at opposite ends of the field. There were cheer leaders with their megaphones, girl students who turned somersaults, and the songs of the different supporters. Added to all this were the cheers from the spectators, the whole making a din which at the finish left us quite exhausted. McGill beat Toronto and the McGill students' band draped in red cloaks marched off the ground led by a drum majorette, a pretty girl in Hussar uniform who gave an exhibition of one-handed somersaults along the main street as she led the victorious team away. After this din, the clatter of teacups, the clinking of glasses and the hum of conversation at the party, which followed at the C.R.A.M.C.

Armoury was really restful. Here again we were introduced to many medical officers and their wives. We dined that night at the Military Hospital, which occupies the imposing home of the Lieutenant-Governor of the Province of Ontario. The officers' mess is handsomely furnished in these fine surroundings and we had an enjoyable dinner with Lieutenant-Colonel Andrew and the officers and nursing officers. One officer present, whom many may remember, was Brigadier Macfarlane, the Consulting Surgeon to the Canadian Army during the War. He it was, I discovered, whom we had to thank for the tickets for the football match, a none too easy task when every seat could have been sold twice over. Brigadier Coke made an after-dinner speech to which I replied, and we finished up by dancing to the strains of a gramophone after a delightful evening.

The next day was Sunday and it was unfortunate for my hosts that I was visiting the Depot of the C.R.A.M.C. at Camp Borden. This lies about 30 miles north of Toronto, in country studded with fine forests and lakes. The depot is hatted and is most excellently organized and administered. Lieutenant-Colonel Slack is a keen and energetic C.O. and I thought he had reason to be proud of his unit as he showed me round. I remember especially the fine hygiene museum. The training task is small compared with ours as only volunteers are dealt with, and the class of recruits I saw under instruction was ten in number, while the medical officers and nursing officers' class which were being taught together was about the same size. There is, of course, no conscription in Canada and all are regulars.

We had a luncheon with all the officers and their wives who had come to meet us and we must have sat down 50 or 60 in number. Camp Borden is a military community about ten miles from the nearest town, so that the officers and their families, like many other military stations, are largely dependent upon their own amusements.

On the next day we motored from Toronto to Niagara along the western and southern shores of Lake Ontario with its orchards and farms. We paid a long visit to the Falls and we had sunshine to make the spectacle a magnificent one. Some visitors, I believe, are disappointed at the height of the Falls. We paid a visit to the American side amongst the islands there. While on the Canadian side we went under the Falls and saw the stupendous rush and roar of the water as it slid down in a solid wall before us. We soon appreciated the reason for wearing oilskins and gum boots. Going down the Niagara river in the afternoon we visited the General Brock monument. Brock was a British general who fell at the height of the battle between the British and the Americans who were invading Canada from across the Niagara river. There were heavy losses on both sides and the Americans finally withdrew. It was, I think, during this war that the Americans burned down what was then called Yorktown and is now Toronto, and we retaliated by burning the White House in Washington, an incident of which I was reminded by General Bliss. That night we stayed in the General Brock Hotel and watched the coloured search-

lights playing upon the Falls; a colourful spectacle which we shall long remember.

We took leave the next day of our kind hosts Brigadier and Mrs. Coke and we went by train through attractive hilly and wooded country, crossed the Susquehanna River at Harrisburg and returned to Washington. I can remember how uncomfortably hot we were in the air-conditioned train and the inability to open the windows and let in a breath of air made us condemn air-conditioned trains forever. We again found the meals in the Pullman cars very expensive and lunch cost us about £1 a head.

Our stay in Washington lasted for the next fortnight and I had many varied and interesting experiences visiting both military and civil institutions.

The U.S. Medical Corps has about eight very large Army hospitals throughout the States, all of them over 1,000 beds. These hospitals are nearly all quite modern in comparison to the military hospitals in this country. This would hardly be difficult when we remember that the last permanent military hospital is the Q.A. Hospital at Millbank, built in 1904. The American hospitals were mostly built during the economic depression of the 1930's. Government policy at that time was to use the unemployed on Government work and all these fine modern military hospitals resulted.

The military hospital at the Army Medical Center at Washington is known as the Walter Reed Hospital in memory of Colonel Walter Reed of the Medical Corps who was the great worker on yellow fever.

I was very envious of the buildings, the furnishings and the equipment of this fine hospital. There are 8 operating theatres and about 100 operations are performed each week. Certain beds are set aside for veterans, but generally speaking the Veterans Administration in the States is a powerful organization which has its own hospitals and is run by its own director-general and staff. A suite is maintained for the President of the United States when he is ill, and it is also customary to treat other senior government officers. I visited the barracks of the staff, very similar to our own. All had sheets but pyjamas, I understood, were not issued. The canteens, dining halls and recreation rooms were finer and better furnished than ours. I came across no officers' mess, but there was an officers' club in the extensive grounds where all officers went for meals and where, I believe, the chef is paid a salary of 700 dollars a month.

The Armed Forces Institute of Pathology is housed in one of the older buildings in Washington, and when I visited it Brigadier General Drew, the Commandant, told me of the vast field for research. There are almost a dozen experts in different branches of pathology, many of them civilians, and the material available for research is very extensive. For example, I was told there were 35,000 enucleated eyeballs. The museum itself is well stocked and the whole institute impresses one by its magnitude and the scope of the work which is being done.

I was privileged to address the Surgeon-General's Monthly Medical Meeting in the Sternberg Auditorium of the Walter Reed Hospital on the evening of

November 9 and the subject I chose for my talk was Health Discipline. The address is to be published in the United States Armed Forces Medical Journal and officers may be interested in what I said to our American colleagues.



General Cantlie delivering the address to the Surgeon-General's Monthly Medical Meeting in the Sternberg Auditorium, Walter Reed Hospital.

For the next three days I attended the annual meeting of the Association of Military Surgeons at the Statler Hotel. This is an annual meeting of medical officers who have at any time served in the Army, Navy, and Air Force, so it can be understood that the organization is large and powerful. Papers were given by military and civilian doctors on the advance in medicine and surgery which had taken place in their particular specialities in the last year. These annual congresses are the opportunity for a number of American business firms to advertise the latest advances in drugs and equipment, and displays ranged from highly scientific medical apparatus to a coca-kola bar, where free drinks were dispersed to all and sundry.

A great deal of importance was attached to the opening of the Congress and the Presidential Address was delivered by Rear-Admiral Joel T. Boone, who was a most popular and delightful president.

We had a large dinner in the Statler Hotel at the end of the congress. There were many delegates from the International Congress at Mexico present, and during the evening we were presented with due ceremonial with medals

of the Association of Military Surgeons and the certificate which is now my valued possession.

A military orchestra, which happened to be playing six feet behind me made conversation with my neighbours none too easy. I had Admiral Swanson, the Director-General of the Navy on one side and Major-General Grow, the Surgeon-General of the Air Force, on the other. Lieut.-Colonel and Mrs. Matheson and Lieut.-Colonel Meneces were at the dinner.

The principal after-dinner speaker was Mr. Matthews, the Secretary of the Navy, who made our flesh creep with the destructive power of atomic warfare.

This association of military surgeons emphasizes one of the great customs of American life which goes in for meetings of this nature in a big way and which we could often follow with advantage.

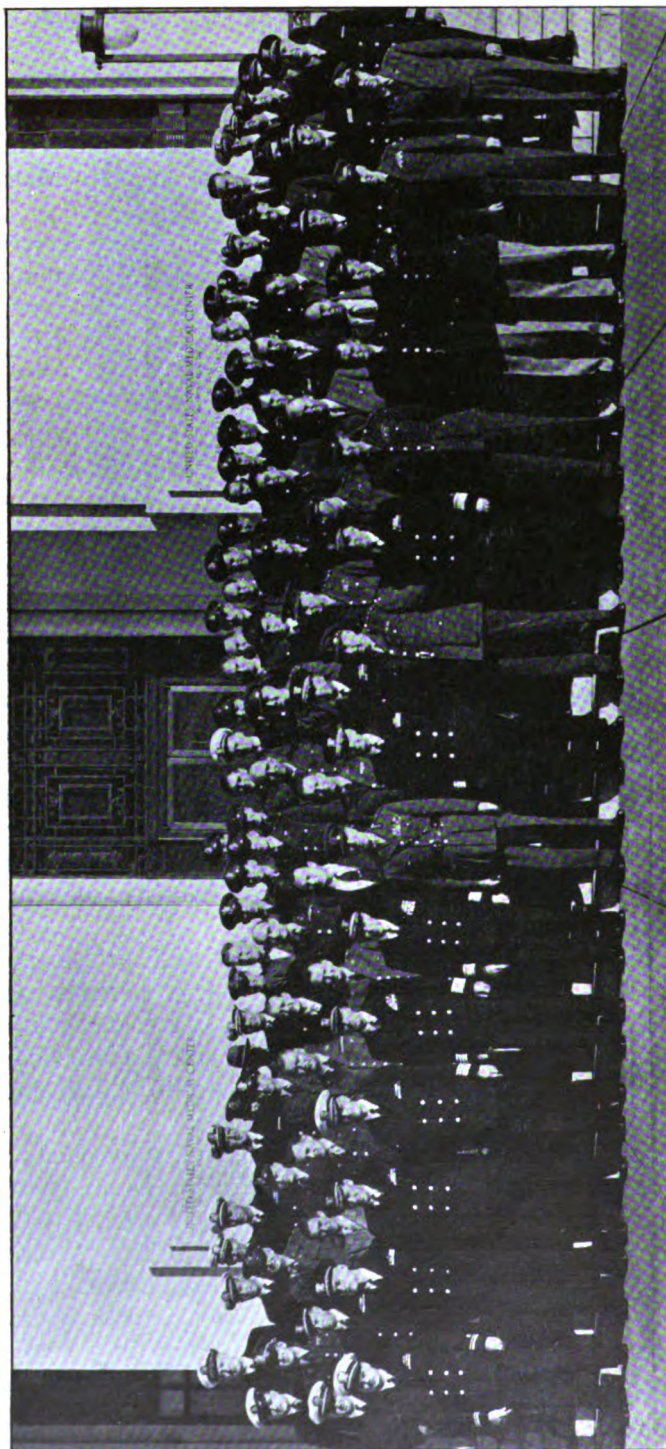
The hospitality offered at the stag smoker which occupied one evening at the Shoreham Hotel where we all consumed vast quantities of beer and hot dogs—the hospitality I say was so great that it was with an effort I took my seat the next day.

On November 13, being a Sunday, I had no engagements, so we were free to do as we pleased and we went to see some friends who were living in Virginia, about 20 miles from Washington. With them we visited the Falls on the Potomac River which is a favourite and picturesque Sunday afternoon picnic resort. The river plunges down in a series of rocky falls and is surrounded by woods which stretch away on every side. The woods seemed to be full of shooting parties, and there is no law in America which preserves ground for shooting in the same way as we understand it. It's a free for all. Anyone can "hunt" (as it is called) and everyone seems to. There are numbers of fatalities every year when a human target is mistaken for game and that is why all "hunters" wear red clothes. There were several shots nearby as we drove along and the main bag here I was told consisted of squirrels and opossums, both of which I believe are good eating.

Our friends had a log house built of old timber, and looked anything but new, but the kitchen was adorned with every modern electrical gadget, and there was central heating and a deep freeze. Our host was engaged in building a garage himself, and when I asked why he didn't hire a bricklayer he told me that the wages of a bricklayer was 30 dollars (£10) a day and that few people could afford to pay such wages.

The country in this part of Virginia is wooded, and is not good agricultural land, although we saw crops of Indian corn. The forests are mainly second growth wood, this is poorish timber which has grown up after the felling of the primary forest and a great part of the Eastern States is in this condition.

On November 14 the meeting of the U.S. Armed Services Field Medical Materiel Group took place at the U.S. Naval Medical Center at Bethesda. This is an Inter-Service meeting in order to obtain uniformity in the equipment of the Medical Corps of the American Army, Navy and Air Force. There were at least a dozen panels on various products and Lieut.-Colonel Martin Rae



Meeting of the Inter-Services Field Medical Materiel group at the U.S. Naval Medical Center at Bethesda.

(A.M.D.3) came over especially to attend the meeting. We saw a great deal of interesting items which were being standardized, and we took our own part in discussion in the various panels. The meeting opened with a session in the very fine hall of the Naval Medical Center, and the Chairman of the U.S. Naval Medical Corps was kind enough to extend a welcome to the British delegates, to which I replied.

The meeting was conducted on very friendly lines and our discussions were frank and free. The more we saw of our Army and Navy colleagues the more we liked them. Admiral Wilcutts took me round the Naval Medical Center which includes the Naval Hospital and a large Research Institute. The hospital was completed only a few years ago and has a central sky scraper which goes up to about 20 storeys. It was a case again of a very modern hospital with the latest equipment, and made me feel inclined to break the tenth commandment. The Naval doctors were very proud of their maternity wing and I was told that over 3,000 normal births had taken place without a maternal death. The various dining halls gave one the impression of shining metal, polished floors and plastic table tops, all scrupulously clean. The officers' luncheon room was on the cafeteria system, where we lined up in the usual way. Soup, meat and vegetables and ice cream or other sweet, together with coffee was the fare.

In the evening I dined with the Society of Army Consultants of World War II at the Officers' Club at the Army Medical Center. The Consultants have an annual meeting in the Army Medical Center and papers are given by different doctors on the advances in medicine and surgery which have taken place during the year. Then members of the Surgeon-General's staff give a picture from the Medical Department's angle. This symposium struck me as an idea we might copy. I was glad to meet some old friends of North African days, amongst them Colonel H. Perrin Long. We sat down to dinner about 60 strong, and the chairman, Dr. Thomas, had Mr. Gordon Gray, the Secretary for the Army, on his right, and I sat on his left. We had the usual good dinner of three courses and all my experience showed that we eat as much in this country as they do in the States. It is true that we eat less meat, but the number of courses at dinner never exceeded three. The first course was usually a prawn or shrimp cocktail, which in the States is always known as seafood. The second course is usually a fairly large steak or chicken or turkey. The third course is a sweet which is usually ice cream and pie, such as apple pie, banana pie or pumpkin pie, and all these I thought delicious. The drink is always iced water.

The chairman had warned me that in his after-dinner speech he was going to pull my leg, and the method he adopted was to talk about a visit which he had paid to England as a member of the Philadelphia Cricket Team. His amusing references to his experiences in England were, however, in the friendliest vein, and when I got up to reply I had little difficulty in returning the leg-pulling compliment. Everyone had dined and wine well so that serious speeches were not expected, and I noticed that it was the custom for the principal speaker to speak last. So Mr. Gordon Gray's speech brought a very

pleasant evening to a close and before the end I had made the acquaintance of all the best brains in American medicine.

On November 25 General Bliss entertained me at luncheon at the Officers Club in the Army Medical Center and a party of about fifty sat down to an enjoyable meal, which included that speciality of American dishes, chicken à la Maryland. It was an informal gathering and included Dr. Meiling, Medical Adviser to the Secretary of Defence, the three Director-Generals and Admiral Boone.

I was asked to say a few words on my impressions of the United States, and I was glad to have the opportunity on this occasion to thank all my hosts for their wonderful hospitality and friendliness. I was able to say how much I was impressed with the high standard of their military hospitals and their professional skill.

On this day I visited the George Washington Hospital, which is one of the newer civilian hospitals in the city. I was taken round by the Dean, Dr. Bloedorn, and I met amongst others a U.S. Medical Corps Officer who acted as the commanding officer of the Officers' Training Corps in the University of Washington, of which the George Washington Hospital is a part. The scheme is that a selected medical officer who is doing his post-graduate work for his speciality in the hospital has the status of a lecturer and is known as the Professor of Military Science and Tactics. He gives lectures on this subject to all students and acts as O.C. of the O.T.C. It appeared to me to be an excellent idea. The cost for a patient at this hospital is 20 dollars (nearly £7) a day apart from doctors' fees, X-rays or laboratory investigations. The cost of treatment in the States for private patients is very high and there are a good many insurance schemes in force which the general public subscribe to. A novel feature here were private suites where doctors who are attending maternity cases in the hospital could spend the night while waiting for labour to commence.

On November 17 I spent the day at Edgewood and Baltimore. I was accompanied by Colonel Wilson and Brigadier Coke and we drove first of all to Edgewood along a fine road through wooded country with farms which seemed to have poorish soil. Edgewood is the Army Chemical Center, and I was shown by Colonels Cox and Wood the research work which was being carried out on various projects in chemical warfare and industrial hygiene. The Medical Corps is responsible for industrial hazards occurring in all the civilians who work in army factories. Here, too, there are experiments going on on wound ballistics.

We lunched at the Officers' Club with our host Brigadier-General Pullene, and I can remember that we ate the most delicious ham.

We drove afterwards to Baltimore and visited the Institute of Public Health. Here Dr. Turner, who is the Professor of Bacteriology, showed us research work which is being carried out on the common cold and on poliomyelitis and syphilis. Students come from many countries to attend this institute and take their public health diploma.

Echoes from the Past

SIR JAMES McGRIGOR, BART.

Surgeon-General Sir James McGrigor, Bart., K.C.B., F.R.S.,
Director-General of the Army Medical Services

BY

S. LYLE CUMMINS

(Continued from page 154)

PART III

MEDICAL SKETCHES OF THE EXPEDITION TO EGYPT FROM INDIA. 1801-1802

"The prevention of disease is usually the province of the military officer and is mostly in his power: the cure of the sick lies with the medical: in the expedition to Egypt very much was done by both." This proposition, though still true for the military officer, has also to take into account the making of troops to conform to the measures laid down by the sanitary formations and is, therefore, perhaps, less true than formerly, thanks to the understanding of the *causation* of disease acquired by the sanitary officer in particular and, indeed, by the ordinary medical officer himself. The formation of a definite Sanitary Corps as a part of the Medical Corps, as first suggested by Florence Nightingale, has led us, through wonder after wonder, to a stage at which disease is often really checked in its attacks upon an Army in the Field. But still the role of the Military Officer is an essential one. He must see that the advice of the sanitary officer is obeyed. Nowadays that link between the combatant and the medical officer is there for all men to see. It was strikingly absent in McGrigor's time and the Armies employed, albeit small ones, suffered for the want of it. Think of the disasters at Walcheren, and at so many places like it, and see how the medical officer, going in for *cure* as opposed to prevention, failed utterly to check the disease which was rampant everywhere in spite of the discipline of the military officer!

In the Expedition to Egypt, very much was, indeed, done by both but the plague was not stayed! The role of mosquitoes, of fleas, of bugs, of ticks, of a hundred and one other "vectors," from animal to man or from man to man, was quite unsuspected and quite left out of account! I say this with no disrespect for the "military officers" of the Army, good collaborators as they are with the "medical," but as marking a distinct line of advance from the days when all the medico had to do was to treat his cases and all that the military officer had to do was to lead and discipline the men. Now they have a closer union in, together, working against the *parasites*, visible or invisible, that reduce healthy men to the wasted skeletons of inefficiency which crop up when this co-operation is either wanting or slack.

The book begins with a listed comparison between plague and yellow fever which is now of little importance and will therefore be left without further notice. There is also a table of returns of the deaths and diseases from 1801 to 1802 in the British and Native Armies which shows a distinct similarity and is not, perhaps, worth quoting at this remote date.

"The Army," says McGrigor, "penetrated Egypt by a route over the desert of Thebes, a route unattempted by any Army for, perhaps, two or three hundred years." This, indeed, constitutes a record and is greatly to the credit of Sir David Baird and his officers and men. It is true that there was no enemy in the path and that they had not to oppose a defence—but, even without such opposition, they had the great enemy of all troops to confront—the want of Water! Well do I know what they faced. Well does every man know it who ever had to march in similar conditions. The Army that faces such a march as this and puts it over is, in my opinion, a well-led and efficient Army. Such was the Army led across the desert by Sir David Baird.

Now, with the Suez Canal as an unfailing waterway connecting the Mediterranean with the Gulf of Aden, it is difficult to imagine how totally was the East cut off from the West at that time. From India one went to some such place as Kosseir and thus across the desert to Egypt; not through the Canal to Port Said or Alexandria.

McGrigor, like everybody else who lands with troops in Egypt, noticed that diarrhoea broke out among the troops on landing; which he was inclined to attribute to the drinking of water containing magnesium sulphate. This "Gyppie tummie" one now puts down to a germ or germs. It is interesting that nearly every man got it and also that, having got over it, the men started to be very fit and well able to start their desert journey. The marches were always performed at night and the forces reached the banks of the Nile at Quennah with a very inconsiderable loss and, on the whole, in a state of very good health, traversing the desert, as they did, along nearly the same route as that taken by Bruce some years before. "On the 29th, at Le Gita, close to Quennah. in my tent, at 3 p.m., the mercury stood at 114°. In the soldiers' tents it could not have been less than 118°. In the morning, at 6 a.m., it was 65° in a well and fell to 63° but evaporation must have had a share in the reduction." Thus does McGrigor make his little meteorological observation: recording a temperature which is still typical of that particular portion of the Nile bank in the month of May! They were camped opposite the ruins of Denderah which could be seen on the far bank, beautiful under the light wind of morning and the effulgence of the Egyptian sun.

On July 27 and on the following day, the force took boat—the gyassa, probably—just as we took boat to get down from Khartoum to Atbara a hundred years or so later! On August 12 the travellers reached Ghiza after a voyage of nearly 400 miles where they were quartered for a few days before taking up their station on the Island of Rhoda, a small island where the Nilometer is placed, and where the men, healthy enough on their arrival, were soon very much afflicted with fever and with ophthalmia. At Ghiza there was a regiment.

the 89th, and a general hospital which had been pitched under the direction of Dr. Franks, the Inspector. "So sickly was the regiment in garrison at Ghiza (the 89th) that they could not muster 50 men on parade." It was noticed that those sent to hospital, ill of ophthalmia, dysentery and hepatitis, rarely left without an attack of the prevailing fever which must, I suppose, have been, for the most part, malaria since it cleared up in a few days; but it may, of course, have been a seven days' fever conveyed by the sand-fly or "phlebotomus fever" itself! We may guess that it was some fly-borne complaint but, apart from this, it is too late to say more. Later, the greater part of the army encamped at Rosetta. The 87th regiment and two companies of the 7th Bombay regiment went into quarters at Damietta close by.

McGrigor must have been now the Senior Medical Officer of the whole Indian Army, having come north with the troops now mentioned as stationed near Alexandria. His precautions against plague we have already mentioned and we wait, as McGrigor himself must have waited, for the inevitable sickness which was expected to fall upon the troops. We shall put it in his own words: "On the morning of the 14th (we must presume that it was the 14th September) I discovered a case of plague in the hospital of the 88th regiment. Antonio, one of the hospital cooks, who had for 60 hours laboured under febrile symptoms, showed one or two boboes in his groin." We must recall how he had "spotted" this case while passing through the washing room of the hospital. Now that attention was called to the chief symptoms and signs the detection of other cases became easy and the 88th regiment was speedily regarded as definitely stricken; a room being immediately allotted for cases under observation. "By the 16th, six cases were discovered and sent to the Pest House which was now established." It is remarkable that no plague cases occurred in other regiments during September but the cases in the 88th steadily increased, nine more cases being sent to the Pest House on the 17th and 18th and more later. During October, however, two cases appeared in the 61st regiment and a further case in a "follower" of the 61st. In November the disease increased and in December 38 cases were reported. Then, in January, the whole force except the 7th Bombays was transferred to Alexandria and left, for the moment, the plague behind it; Alexandria "where they attained a degree of health they never had at Rosetta"—*no cases of plague*. It seems to me that the limited number of cases of plague that had occurred at Rosetta must have been by infection from the natives themselves rather than contracted in the regiments—for a reason that will soon be made apparent—and that they left the infected town and appropriated clean barracks at Alexandria without developing any cases at first. On the 28th, however, a certain Signor Positti came from Rosetta and lodged at the house of a Mr. Fantuchi, the Swedish consul, contracted plague and died on the 30th, and he is accordingly held to have been responsible for spread of the disease. "Almost all the cases that subsequently appeared in Alexandria could be traced to this man as a source." So says McGrigor—and, on this occasion, we venture to disagree with him. The cases in Alexandria must have developed from infection

contracted from the natives as soon as the troops began to be in touch with them. There appear to have been some in February and, in March, there were 72 cases in the Indian Army. In April, there were 26 cases of plague, including four Assistant Surgeons. This seems to have been virtually the end of the epidemic.

Prevention.—One reads of the measures taken with great interest and great surprise. Everything, it seems, might have been done with a view to getting rid of the flea if McGrigor had by some prophetic instinct had this end in view! The measures taken must have had a great effect in stopping *further* spread of infection even if now too late to save the men from the bites of infected fleas in the first place. "No man left the Old Hospital till all his clothes were washed: his hair was cut short and himself washed. On coming to the outside walk of the New Hospital, every man stripped himself naked and went into a warm bath before his reception into the hospital." And again, in this connexion: "In suspected Corps it was ordered that, under the inspection of a commissioned officer, every person should be bathed more frequently and at stated periods: and likewise that all the clothing and bedding should be frequently washed and baked. To all the hospitals, ovens and smoking rooms were attached. Quarters of Corps Hospitals and ground of encampments were frequently changed. Fumigation with nitric acid was common."

If Dr. McGrigor had had full information as to the danger of fleas he could not have done much better in his efforts to get rid of them! It seems to me that the relatively small number of cases of the plague that occurred among the soldiers of the Indian Army must have been kept to small proportions and greatly reduced by the measures which are laid down here, *in all innocence of the fact that they were valuable measures against the infestation by fleas* in addition to being of general efficiency. It is probable, however, that the number of cases of plague amongst medical officers might have been reduced had the facts about flea infection been known. "Thirteen British medical officers did duty in the Pest Houses: of these, seven caught the infection and four died." Strict attention to the danger of fleas might have saved all these men, gallant fellows that they were, from becoming infected. The very measures advised for the troops in general, frequent bathing, changes of clothes, as well as a stricter attention to direct destruction of fleas themselves, might have prevented the catastrophe in cases exposed to great risk because closely associated with numbers of plague cases collected together. Well may McGrigor soliloquize as follows: "Mr. Tonrey and myself, who attended the first cases, were amongst the few medical men who were exposed to the contagion and came in contact with the patients and yet escaped the disease."

One man amongst these medical officers had the prophetic idea of defence against the plague by inoculation! Unfortunately for himself he had no conception of the necessity for the precautions now taken to see that the inoculated material is "dead." Dr. White inoculated himself, both rubbing into the skin of the groin the contents of a bubo from a woman patient and, next day, inoculating himself on the wrist with a lancet infected from the bubo

of a Sepoy; this on January 2 and 3, 1802. On the evening of the 6th he was attacked with fever and he died on the 9th. It is tragic to recall that it is by the inoculation of plague germs that the disease is now very successfully prevented; *dead* plague germs. Unfortunately his gallant attempt was with the living!

The treatment of the plague, which was chiefly by mercury, is not perhaps to be commended; or would it be more correct to say that this rather heroic method is no longer regarded as necessary? But McGrigor has something to quote for it, nevertheless. Mr. Thomas, one of the Assistant Surgeons, after being three weeks in the Pest House at Rosetta, attending the first plague cases in the Connaughts, got plague. He rubbed in mercurial ointment in great quantity every hour and he "took as much calomel with opium as his stomach could bear. His gums were quickly affected, his bubo came to suppuration, and, in three weeks, he was quite well." McGrigor made each of three early cases take "2 grains of calomel and a 1/6th of a grain of opium every hour and made them rub half an ounce of strong mercurial ointment into the inside of legs, thighs and arms and neck three times a day and made them take each half an ounce of nitric acid during the day and put their feet and hands, three times during the day, into a strong nitric bath. In about twenty-four hours their mouths became severely infected, a tenderness in their arm pits and groins went off and the severest febrile symptoms yielded." They appear to have become very much devitalized but all eventually recovered.

It was the age of heroic treatments, and mercury, following the germs into the lymphatic glands, *may* have had some effect in lessening their activity! At any rate McGrigor appears to have had some success with it!

Turning to other diseases found common during the expedition, he says that "in the beginning of the month (October) the whole sick of the Army amounted to 1,350, or more than one-fourth part of the whole strength of it." This was Rosetta; "one of the largest and worst built towns in Egypt. There is hardly a street in it. There are only narrow dirty lanes with high houses overhanging each other and the passage frequently interrupted by houses in ruins. It is on two sides surrounded by swamps. The river is in front and, behind, it is nearly encompassed with burying grounds." How unhealthy the town was as a place of garrison may be judged from the above statement as to the number of sick. And this was not all. "The fever was, in several instances, similar to a type we had been little used to, *viz.* the typhoid." I imagine that, with an Army composed of young soldiers, lately drawn from the large towns as well as from the country, this type would have prevailed far more heavily. McGrigor speaks of the advantage of having the Cape of Good Hope as an intermediate stage on the way to India. "After being in this healthy settlement and there seasoned to a warm climate, the 80th, 84th and 86th regiments and the Scottish Brigade landed in India in an effective state never before witnessed with European troops in that country." He was talking of soldiers already veterans to a warm climate when he spoke of typhoid as a type he "was little used to."

Hepatitis and dysentery are mentioned as very prevalent. Speaking of Connaughts alone, as a regiment with which he was especially familiar, he makes the observation that "during the month after that on which the monsoon set in, one hundred and forty or more than one-fourth of the Corps were ill with hepatitis or dysentery." Speaking of India he says: "In that country when any of the abdominal viscera are complained of, we may, in general, suspect some error of the hepatic system. In India the liver seems to be the seat of disease in nearly the same proportion as the lungs in England." In India, the first cause of dysentery is to be sought in the biliary system but, in Egypt, as in Europe, it is, thinks McGrigor, a disease of the intestinal canal. Here he is vaguely seeing, I think, the real differences between amœbic dysentery and bacillary, the latter being far commoner in Egypt. For what he calls "European" dysentery he advocates putting the patient on an antiphlogistic regime; though Mr. Kunton, surgeon to the 61st regiment, believed in "giving laxatives and keeping up a determination to the skin." For the Indian dysentery "the best treatment appears to be, after a dose of castor oil, to give opium liberally by the mouth and by clyster; and to make the patient drink freely of gum arabic at the same time." The dysentery of Egypt he regarded as a very severe disease. "This was by far the most generally prevailing as well as the most fatal disease in the Army." And it was much more common in Europeans than in the Indian natives. "In the general return for the first week in November there appear 160 cases, and 123 of these are Europeans." It may be mentioned that the numbers of Europeans and of Indians in the Indian army in Egypt were approximately the same.

Another disease which gets especial mention is ophthalmia. This, as was to be expected, was very common. "Several gentlemen thought that the disease, in Egypt, was contagious." There is some argument as to this but McGrigor concludes: "However, the remarkable prevalence of the disease in particular regiments and even in particular companies . . . will not be easily accounted for without admitting something of the kind." He adds: "I believe that several diseases are contagious which are not suspected to arise from such a cause." And again: "The exemption of the Officers from the ophthalmia gives more weight to the opinion that, in Egypt, this disease must be communicated by contagion." One sees how rightly he was thinking although bacteriology had not yet developed to give his speculations the basis of truth.

The guinea-worm was a complete puzzle to McGrigor. The 86th regiment had no cases and continued clear until "the setting in of the monsoon" in Bombay, where the disease was common amongst the natives but, in due course, the disease appeared and the regiment had nearly 300 cases. The 88th, during their fifteen months at Coulabad, about a mile from the city of Bombay, had only one case of guinea-worm. It was only after sailing for Ceylon that the disease broke out; but it became a very serious matter in a few weeks, 161 being affected out of a total of 360. How was this extraordinary distribution of the disease to be accounted for? We now know the explanation. The embryos, escaping from the worm which has emerged from a human case, into the water

of places in which a certain form of cyclops abounds, swarm into the bodies of the cyclops and, there, undergo the changes preparatory to re-entrance into humans, and, the water containing the infected cyclops having been drunk, once more set up the disease by forming fresh worms which gravitate or climb to situations where water is easily reached, when the uterus of the worm, full of embryos, once more bursts and releases them into the water. The time necessary for the whole change, from the infection of human beings by the entering embryo to the fresh worm discharging its embryos into water, is about a year. This explains why whole companies or regiments of men, exposed at the same time without any immediate harm, go down after about a year of freedom, with the horrible disease known as guinea-worm, all or most getting the affliction almost simultaneously. It is a neat little story from the records of helminthology which, though well known to medical men today, was quite outside the possible knowledge of McGrigor and the surgeons of his time. But the appearance of the fully developed worm in the subcutaneous tissues of the legs, the scrotum, the pudenda, anywhere frequently washed or immersed, the little patch of emergence of the discharging "head"; and the necessity to extract the worm by rolling it up slowly on a small stick or other holder—with the great danger that, by rolling it too swiftly or too roughly, one may break it and cause prolonged suppuration of the wound—is well described. "Often, on the first day, we succeeded in extracting a foot or even two of the worm." "It resembled much what is called 'bobbin' and was about the same size. It was transparent and moist, a white liquid being seen in it." This white liquid is now recognized as being the embryo-carrying fluid. "I heard of one gentleman in Bombay who had one in his scrotum and penis and of a lady who had one in the pudenda." McGrigor found that it was "often possible to cut down on the worm and that he could frequently extract it partly or wholly by getting hold of it about the middle."

He speaks in general terms of the health of the various British Units concerned. "The 61st regiment came from the Cape and was in excellent health on arrival. The men were all young and very healthy. The 10th Foot, had it not been that they made several unnecessary desert marches, would have been as good as any.

The 80th regiment, from five years at Trincomalee, a very unhealthy station, was nevertheless very healthy on landing. It was composed of "old Indians." (McGrigor means that its men were well "baked.") The 86th regiment: six years in a tropical climate; but after Rhoda Island, were very healthy.

The 88th regiment, after three years in a warm climate, were very fit on arrival, but, after Ghiza, the regiment sent in one-fourth of its strength to hospital, all cases of fever or ophthalmia. In this regiment, plague first broke out and they had more cases and more deaths than any other European corps. The 88th were, later, the best in the Army, losing only two men from December 1801 to May 1802.

In general, the Thebiad or Upper Egypt is healthier than the Lower. "Never were troops more healthy than the Army when encamped near Quennah."

Ghiza, which had long been the station of large Armies, alternatively of Turks, Mamelukes, French and English, they found very unhealthy. "At no time, I believe, have troops on any expedition been so long confined on ship-board as during that of which we are treating, and in none, I believe, not even in the shortest, has there been a smaller loss of men." This exemption he attributes to the *roomy* ships provided and also to the "large stock of potatoes, of onions, fresh fruit, pickled vegetables, often rice and pepper, which were regularly served out to all."

McGrigor was very keen on the value of bathing for the preservation of health. "From the time of the first landing at Kossier, in every situation where it could be done, bathing was enjoined for the Army." This preference was expressed for its general value but it had, too, an especial value in an army that was to be exposed to the plague: a value which McGrigor could not appraise but which must have counted to a considerable extent.

I feel that enough has now been gleaned from this valuable little book to bring its principal lessons to light and to quote from it some of the ideas as to disease which have since been proved to be erroneous and in need of correction by what is now common knowledge. The volume strikes me as being of great interest and considerable value to all responsible for the health of troops in Egypt.

Before leaving it altogether, however, I should like to call attention to two marginal notes in the particular copy which I borrowed from the Royal Society of Medicine and which seem to me to be of considerable historical, as opposed to medical, interest. The existence of these notes, moreover, one of them in the handwriting of the author of the book, seems to prove that the little volume was, at one time, the property of Sir James McGrigor himself.

On pages 74 and 75: "The circumstances I learned from a Member of the French Institute and from the Pharmacien-in-Chief to the French Army who often related to me the order which Buonaparte gave him to poison the wounded with opium." Then follows another note in manuscript. "The same thing was repeatedly told me by the Chief Physician Desgenettes, at Lord Hutchison's table, after the surrender of the French Army, and heard by the whole British staff. Yet this subtle sycophant, afterwards, when Boney was Consul, happening to meet at Turin Dr. Joseph Frank of Wilna, learning that he was coming to England, desired him to contradict and deny that he had ever said so." Then, *in another hand*, a further note is added: "Sir Sidney Smith told me that on entering St. Jean d'Acre not a French soldier was found in the hospitals alive—they had not been poisoned but had died of (native) disease—The case was hopeless when the rear-guard left them and Buonaparte did say that opium might be given them that they might not be tortured by the Turks into whose power they must fall in a few hours. Desgenettes has told me that the men were *in articulo*. Larry said the same. I therefore leave to others to decide what was the most humane conduct—to allow them to be put by torture to death by the Turks, which was certain, or to accelerate their death without

torture." Evidently the writer of this last note did not himself quite believe Sir Sidney Smith!

One more experiment I must quote before quite finishing with the "Medical Sketches of the Expedition to Egypt from India" since it illustrated the care which McGrigor used in applying the simple methods available to make observations on subjects of importance. This was a method—the delicacy of which I cannot vouch for but which shows his mind at work—to estimate the amount of dew in the atmosphere at various points: "From some experiments I made in India, on the Red Sea and, lastly, in Egypt, I am inclined to think that they are equally heavy in the two former as in the latter quarter. After weighing it carefully, I took a piece of lint twelve inches square, exposed it for a night in the dew, and by weighing it in the morning again, ascertained the quantity which it had gained. By this method the dew-fall in Bombay, the Red Sea and Lower Egypt was much the same. I should have thought that the relative dryness of the air would have taken up a varying amount of water from the square of lint—but I am not an authority on such matters! But the trial of any reasonable method was something to praise and McGrigor's keenness to find things out for himself is shown in this little experiment.

RETURN TO INDIA

So the expedition started back to India and reached Mocha in due course where they found orders to stop at Butcher's Island for a period of quarantine. McGrigor found that, by a recommendation of the Medical Board of Bombay, he had been appointed Quarantine Officer; this pleased him greatly; he was the first King's officer to be so honoured. He held the appointment at Bombay, after Butcher's Island, for a total of twelve months.

For the present, however, he took up his residence on the Island where he acted in common with the Captain of a Sloop-of-War stationed there. "So passed several weeks by no means unpleasantly," says McGrigor, "for I read much and, in my Naval friend, had a pleasant well-informed companion for our dinners and walks."

At length, orders came to rejoin at Bombay so his period on the Island came to an end and he once more took over duty as medical officer to the 88th. He appears to have covered both this job and the post of Quarantine Officer under the Company's orders as he mentions holding this appointment. At any rate he re-made contact with all his old friends, medical and other, and more especially with Helinus Scott. "We instituted together many experiments with his favourite remedy, the nitro-muriate acid bath." Then came the order to return to England and, having made his farewells to his many friends in Bombay, he set out for home. He landed at Simonstown and, with the Captain of a Danish Indiaman, proceeded to Constantia to see the productions of the famous Kleine Constantia wine farm. At Cape Town he met with Admiral Lewis who was accompanying the French troops that had been sent out, at the conclusion of the war, to reoccupy the French possessions which, on the making of peace, had been restored to France. The French Admiral and

General, with whom he became friendly, as was his custom, requested him to take charge of some letters and despatches for the French Ambassador in London. With that, he started from the Cape and all went peacefully till they met an American ship bound for India and heard from those on board that the peace had been broken between England and France and, moreover, that privateers from the French had been sent to cruise in the wake of British ships from India.

Captain Gordon had on board his ship, the *Cumbrian*, about 50 invalid sailors and six indifferent guns. These he supplemented with a number of wooden guns, made for the occasion, "quakers" as the men called them, and with the "quakers," arranged like real guns along the sides of the vessel, the *Cumbrian* looked very like a frigate. Sure enough they met with two suspicious ships and, these showing signs of being privateers, the invalid sailors all appeared in their full naval uniform, Captain Gordon and a sick Naval Lieutenant in the same, and McGrigor and a Lieutenant in some Infantry Regiment in full rig. This was enough for the privateers; they quickly retired!

After this little excitement, the *Cumbrian* completed her voyage without further adventure, touching at Bantry, went on to Queenstown, where McGrigor had to hand over to the Admiralty, very unwillingly, all the letters that had been given him by the French Admirals, Generals and other officers for the French Ambassador in London. Thence they proceeded to Weymouth and finally to London by road, his Egyptian servant, Mohammed, causing great excitement, where he did a number of commissions for friends in Bombay, and discharged the many duties that must have been obligatory on officers returning home from abroad in those days of long and rare journeys. Then there was his little book, which he showed to Sir Gilbert Blane who warmly advocated its publication; and yet McGrigor hesitated a little as his friend, Dr. Buchan, he thought, would be writing on the same topic and was likely to produce a better book than his own. "But Dr. Buchan," he says, "who had volunteered for the pest-house when Doctors were dying of the plague, was a first-rate practitioner, a most honourable man, and was possessed of some of the highest qualities of head and heart." He wrote to Dr. Buchan, therefore, but the latter was busy at some other subject and replied that "he trusted I would go on with my work," which McGrigor accordingly did to the great advantage of all who attempt to follow him.

BOOK II

It is always a sad moment when one leaves a corps to which one has for a long time belonged, for which one has had a feeling of pride, the officers of which have endeared themselves by various little kindnesses and attentions until they have become in a true sense "brother" officers, a corps in which one has passed hours of danger, hours of pleasure, hours, perhaps, of suffering; one feels, somehow, as if a bright time of youthful adventure had come to an end and that now one has to justify one's good opinion of oneself to the criticism

of strangers. McGrigor undoubtedly felt this and sets it forth very fairly. "In February, 1804," he says, "with the most profound regret, I took leave of my old friends the Connaught Rangers. The men of the Corps, like their countrymen in general, were giddy, and I confess they committed many irregularities; I might say a few serious crimes; but they were an affectionate, kindly body of men and attached and submissive to their officers in a degree which I never saw in an English or a Scottish regiment."

That is not a bad appreciation of a regiment of Irishmen by a Scot. McGrigor was now transferred to a famous Regiment, the Blues, which was stationed at Canterbury, and I think that I understand why he accepted this appointment. It was time for him to leave the 88th and to seek another unit in which his promotion to inspectoral rank could not be long delayed. There is nothing more delightful for a young surgeon that to be made a member of a regiment and a good fellow like McGrigor soon makes himself an essential element in the regimental life. But a time comes when he feels himself too old and too experienced for a job in which even the last-joined subaltern is, in a sense, his superior in the command of the men. He may have held all sorts of important appointments outside the regiment, as indeed had McGrigor, but once reverted to the Corps, he is merely the Doctor, and, though perhaps greatly beloved, has no executive authority at all. But, in the Blues, though he was still without any sort of authority except that of "The Doctor," he was very likely to attract the attention of important persons and perhaps to be moved on in an ascending manner to one of the higher posts in the medical service. I have no special knowledge, of course, as bearing on his motives, but I can at least state the facts as bearing on an ambitious man placed as he was and longing to get known.

His first experience of his new regiment was not without its comic side! "Soon after my arrival at Canterbury," he says, "Colonel Dorrien, a rigid disciplinarian, made me appear accoutered as an officer of the Corps; and when I presented myself in the ancient costume of that distinguished old Corps, the Royal Regiment of Horse Guards Blue, I burst into a laugh at my own appearance, equipped as I was with a broad buff belt, jack boots that came high up on my thighs, and stout leather gloves which reached nearly to my elbows, with a large fierce-looking cocked hat and a sword of great weight as well as length."

But conformity to the Colonel's notions of what was correct in costume was not the only duty of a medical officer of the Blues! There was the health of the regiment as well; which, indeed, was remarkably good when McGrigor joined the unit. These men, recruited from the country in most instances, were a typically healthy lot. But there are accidents that will insist on occurring, even with the healthiest regiments and there was one awaiting the Blues in spite of their splendid condition. This was nothing concerned with the out-of-hospital fitness of the regiment but an accident which affected the men in the Regimental Hospital, gangrene, to wit! McGrigor describes it as follows:

"A few months after I joined the Corps, gangrene made its appearance in the Hospital and ran rapidly through most of the patients . . . Every man, even the slightest surgical case or contusion, where venesection had been performed, or a blister applied, developed hospital gangrene." Why I call this very serious occurrence an "accident" must now appear evident to every modern medical man. It was obviously the bringing into the hospital atmosphere or the hospital equipment or, perhaps, into the throats of the hospital attendants, of the germ or one of the germs which causes gangrene; probably *Bacillus welchii*. But the germ must have been of extreme virulence and the infection with it open to every patient! But this gangrene on the grand scale, capable of taking possession of a whole hospital and causing infection of even the sites of blistering, is fortunately unknown to us now—though it turned up, still virulent, during the first weeks of the Great War, when we were fighting in a typical gangrene country!

It is very interesting to *read* of it afflicting healthy tissues in Canterbury in 1805, though it must have been a terrible trial to the medical officers of that time. Fortunately the Regiment moved to Windsor just about that time and left the gangrene behind, thus proving that it was an infection caught in the hospital at Canterbury and unconnected with the Blues themselves.

The reason for the move was that it would bring the regiment closer to the King and the Royal Family who really appreciated having their Horse Guards Blue near at hand and who "played at soldiers" with them to their hearts' content. The King, for instance, asked to have a Troop of his own, to be called "the King's Troop" of which he learned the names, counties and everything of all the men and of their wives and children as well, looking after them in a paternal fashion and setting a good example to the young officers who might be a bit slack in such particulars. McGrigor himself was honoured with much Royal notice and had to answer many questions about his former service with the Duke of York—he must have been hard put to it to find answers on such a tenuous subject—and about the West Indies, India, Egypt, and many things on which he was well able to express an opinion. He also dined at the Royal table on several occasions with the other officers of the Blues and, as he says, "surely nothing was ever more splendid than the assemblage." But there was, ever, the sad perplexity of the King himself to be taken into account: a manner generally perfectly normal but, now and then, so strange as to be very noticeable. Once, for instance, on a gala Sunday parade, at a moment when His Majesty was suffering from an inflammatory condition of the eyes, McGrigor expressed sympathy with him and got the answer: "Aye, aye, this is one of the fruits of the expedition to Egypt!"

They must have been all on the friendliest of terms. McGrigor got an attack of whooping cough, or as he calls it, "hooping cough," while stationed there and received a message through Dr. Lind, Librarian to the Queen, from Her Royal Highness, to try rubbing in oil of amber along the spine as a promising cure! This remedy he did not try, though he received the message

with all due appreciation! What he did try was a change of air; "a change from the fine, clear air of Windsor to the close confined air of a narrow street in the Strand, in the course of ten days, my cough entirely left me!" I wonder whether, on his return to Windsor, he thanked Her Majesty for her prescription and said that the rubbing of oil of amber along the spine was a famous cough cure! At any rate, he was quite justified in believing that the transfer to the Blues would put him in the way of offers of high appointments by persons in a position to give them. Whether on account of previous knowledge or as a result of his prominence as a medical officer of the Blues, he was now offered by Mr. Harry Dundas, afterwards Lord Melville, the appointment of Head of the Medical Board to a new Presidency, "the seat of the Government to be at Palo Penang." This, I suppose, was in or near Malaya. He liked the proposition well—it meant, however, quitting the King's service and entering the Company's—and evidently considered it deeply, but he became aware of the stirring up of a great deal of feeling against this new Presidency which was spoken of, by the disappointed, no doubt, as "Nova Scotia" or the new home of the Scots, so many of that redoubtable race were to be included in the Staff, and he prudently decided to drop it though he had told Mr. Dundas that he would be one of them. This meant a communication to Dundas who immediately begged McGrigor to come up to town to see him. As the result of this interview, Mr. Dundas was quite pleasant about it. "When he found me firm, he made the warmest acknowledgments and did full justice to the principles on which I acted." Thus it was that McGrigor remained in the Service instead of joining the Staff of the Company.

But, if he was anxious to get promotion, he had not long to wait!

After hearing, one morning, by chance, that His Majesty had said to a Corporal of the Blues, "You are about to lose your Surgeon; I have, this morning, signed a new commission for him on promotion," McGrigor then heard that he had been promoted to be a Deputy Inspector of Hospitals and he had, moreover, an opportunity of discussing the matter with the King. The interview and the thanks closed with the words, from His Royal Highness, "Aye, aye, all you Scotsmen are ambitious!"

McGrigor's promotion, which had been made through Mr. Francis Knight, was, it appears, not at all popular in the Medical Service at first, though the rage and fury caused by the promotion of another, more or less out of his turn, soon wore off and appears to have been succeeded by an appreciative acceptance of a very good man for a very high office. As to McGrigor, he admits that "the obtaining of the highest rank but one in the Service was to me most important." It is well to advert to the system of promotions and appointments in the medical service at that time, as given by McGrigor. "Shortly after Mr. Keate had been appointed Surgeon-General to the Army, Mr. Knight was appointed Inspector-General of Hospitals and Sir Lucas Pepys, Bart., was appointed the Physician-General; the whole to act as a Board for the management of the medical concerns of the Army." Mr. Francis Knight,

Surgeon to a regiment of Foot Guards, had, it appears, established a good system of running his Regimental Hospital and, further, had a talent for finance. This it was that had marked him out for his appointment to the Medical Board and had led, no doubt, as one of his actions, to the selection of McGrigor for promotion. This, at any rate, was a really good selection and shows that Knight has other talents besides that for finance! But the whole system was, according to McGrigor, defective from the start. "By an absurd and unnatural division of that patronage of which the members of the medical profession are not less ambitious and jealous than the members of the Law and those of the Priesthood, the appointment to the office of the Hospital Staff rested with the Physician-General and the Surgeon-General, while that of the regimental medical rank rested with the Inspector-General of Regimental Infirmaries." Neither of the two former was influenced in the slightest by any former service in the Army. "On the other hand, Mr. Knight entertained very different views on the subject" and *only* appointed Inspectors and Deputy Inspectors from those with long service. This arrangement, which, on the face of it, might have been good, "proved of much dissatisfaction in the Army Medical Board, which spread into discreditable controversy among the officers serving under the Board, the officers of the Hospital Staff and the Regimental Medical Officers." It must have! Think of an officer with ten or twelve years' service, including five or six years in a very trying climate and some turns of active service as well, and the expressed approval of his chiefs, and yet passed over for a hospital appointment by some young doctor who has never served at all! One can imagine his feelings. But at least McGrigor's fate was different and his promotion was a success. No doubt he owed it, as, indeed he says, to Mr. Knight, with whom he spent some little time in London studying the means by which the present needs of the medical service might best be met.

His duties lay in supervising medical matters connected with the troops stationed in the Northern District, including those of the Line, the Militia, etc., distributed throughout the counties of York, Lincolnshire and part of Northumberlandshire. The Headquarters of the District was at Beverly whither he proceeded with his servant, Mohammed, taking Hull on the way because he wanted to visit his old friend, Sir James Grant, afterwards to become his brother-in-law, who was stationed there. Grant, who might have shown a little acerbity as he had been fancied for the very appointment to which McGrigor had been promoted, was, on the contrary, as cordial as a man could be and insisted on accompanying him to Beverly in order to introduce him to the G.O.C. Grant was, at this time, a Staff Surgeon, but was promoted during the following year to be a Deputy Inspector. They met, at the District Headquarters, General Vyse, his Staff consisting of Colonel Delaney and Majors Pritzler and Hart, and his son and A.D.C., Captain Vyse, with whom McGrigor joined to form a small Mess where he had very agreeable society. Here he had a good opportunity of putting his favourite theory to the test. "I bore steadily in mind," he says, "my views of turning the reports and returns made by the surgeons and assistant surgeons of each regiment to the purpose of pro-

fessional and scientific information. Furthermore, I showed that a military hospital was the best for trying the effects of new remedies because there the patient was under more control and observation than in any other. . . . In my inspection of the hospital of each Corps, accompanied by its medical officer, I examined the patient's history, the medical officer reading the particulars of the case at the patient's bedside and the treatment hitherto pursued; I then questioned the patient; generally approving of what had been done but suggesting what might occur to me as to further treatment." In other words, he behaved like a good consultant, or so it would appear from his own account of the scene, and had not any desire to show his authority as a great doctor, which is often the worst of these inspections! He must have been a laborious Inspector. "All the hospital books were sent to me at my Inn where I examined them, making note of my remarks." Typhus was then very prevalent in the Army and another cause of loss of men to the service was ulcerated legs which appeared very difficult to cure while the man was still in the Army. No doubt some of these ulcerated legs were carefully kept-up conditions aided by manipulations by the men themselves but, as McGrigor says, and it sounds very modern, too, "At this time Bayton published his excellent treatise on adhesive straps and bandaging," which must at least have aided the healing of the varicose ulcers of genuine nature.

After various happenings in the Northern District, including the delivery of a Colonel de Gray and a Surgeon Irwin from having to stand a charge of murder over a man whom McGrigor had fortunately seen with Irwin when he was first kept back in hospital though he might easily have been discharged and who afterwards died suddenly, his term of office in the District came to an end. Apparently the Duke of York had reminded Mr. Knight that McGrigor "must not be confined to so narrow a sphere" and that he had decided on confiding to him the South-West District, one of the largest Districts in England. He travelled on horseback to London *via* Lincoln and Cambridge, being shown over the latter University by a Fellow of Trinity; and we may be certain that he enjoyed the trip as it deserved to be enjoyed by a very intelligent traveller. Once in London, he got into touch with Mr. Knight and spent several days with him, getting much information from him as to the diseases prevalent in the Army, and a great deal of information besides. Then he went on to Winchester where he called on the G.O.C., the Duke of Cumberland, and met the officers of his Staff, Major Foster, who had joined as a medical officer and, later, transferred to combatant duty, Sir Thomas Dyer, the Quartermaster-General, Mr. Lindsey, etc. The District proved, as he had heard, a very large one, including all the troops in Hampshire, Dorset, Wiltshire, Somerset and South Wales; and the Isle of Wight was, later, added, comprising several regiments as well as much work connected with the embarkation of troops, and so on.

Here he framed some District Instructions comprising some of his experiences in the York District and he circulated these to all M.O.s in the South-West District as well as communicating his views to the Officers

commanding Corps; he notes that these were everywhere well received. Altogether, with the inspection of 5,000 more men which now fell to his lot, his charge was now the greatest in the country, a matter that failed to chill the heart of this Scot who was prepared to accept any amount of work that might be given him! Not that he quite got off *some* slight tellings off from Superior Authority! The Duke of Cumberland, for instance, reprimanded him for being late for Church on the first Sunday; and he had to read up some local regulations for calling on the Duke previous to going on leave, and such like. But, on the whole, the charge was one well up to his standard and he took it on, I have no doubt, with much enjoyment and interest.

The command at Portsmouth now fell vacant on the transfer of the G.O.C., Sir George Prevost, to another District and this was the occasion of the arrival of Major-General Whetham instead, with whom McGrigor was to enjoy a great friendship for many years. Whetham had been wounded in the chest in a duel some years before and he had suffered much from this; the old wound being complicated by a hydrothorax under which formidable disease, as McGrigor remarks, he lived "longer than any individual I ever heard of"—thirteen to fourteen years! He was in the habit of taking digitalis for the heart failure associated with all these disabilities "according to the prescription of his friend the late Sir Everard Home and it never failed for that long period to afford relief." McGrigor must have been frequently at Portsmouth at this time for he was very much engaged in the fitting out of Transports for troops moving in various directions. As he says himself, "I had to examine each of the Transports appointed for the reception of troops, the quantity and quality of provisions, and particularly the water on board; the accommodation for any sick that might accrue during the voyage, the supplies of medical comfort as well as medicines, together with the stock of chirurgical instruments supplied and embarked for the expedition. I had furthermore to examine and inspect each Corps as to its health when it arrived; to receive each of the Medical Officers of the Staff; to warrant the advance of their pay, travelling charges and lodging money at Portsmouth, and finally to inspect each Transport, etc." It is not clear what particular expedition he was momentarily arranging for; but there were expeditions enough; the Spanish, the Walcheren, etc., to keep a man busy! "At length an overwhelming duty fell on me!" he says. Sir John Moore had fallen at the battle of Corunna and the Army was sent home, the men suffering extremely "from hunger, fatigue and all the privations incident to war." The whole fleet made for Portsmouth, cumbered with a frightful number of cases of typhus which had broken out among the troops before they landed. "The number of cases of fever landed in the last stage of typhus was great; in fact it was enormous and started great fear in the neighbouring county." McGrigor was ordered to proceed instantly to Portsmouth, where he took charge of the hygiene of the disembarkation.

The battle of Coruna must have been a terrible one. The details may

be studied in Napier's History of the War in the Peninsula, pp. 317-331, etc., Vol. I. Both Sir John Moore, the General Officer commanding, and Sir David Baird, commanding a Division, were struck down in the final engagement; Moore to die almost at once and Baird, though very badly wounded in the left shoulder, to gradually recover after his left arm had been removed at the shoulder on the ship which carried him to England. It was here that he enters once more into our story. "On arrival there (Portsmouth) I found an A.D.C. of . . . Sir David Baird waiting for me." . . . "As is well known Sir David had had an arm amputated at the shoulder on board the ship which conveyed him to Portsmouth . . . Sir David had been sent round in the *Ville de Paris* to be near me." McGrigor at once arranged for him to be brought on shore, where his manly bearing excited wonder and admiration, "although," as McGrigor noticed, "his face was wan." There is something touching in this coming together of these old companions of Egypt; the one trusting the other and not being disappointed.

It seems worth while to quote Napier as to the last hours of Moore . . . "Sir John Moore, while earnestly watching the result of the fight about the village of Elvina, was struck in the left breast by a cannon shot; the shock threw him from his horse with violence; yet he rose again in a sitting posture, his countenance unchanged and his steadfast eye still fixed upon the regiments on his front, no sign betraying a sensation of pain." . . . Moore was carried to his Quarters where the surgeons examined the wound. There was obviously no hope. Asking whether the French were beaten and being reassured as to this, he said to his old friend, Colonel Anderson, "You know I always wished to die in this way." Afterwards he said: "I hope the people of England will be satisfied! I hope my country will do me justice!" He was to hope in vain, for the present at least. The people of England, notably dissatisfied over the fighting in Spain and thinking this hurried embarkation merely another defeat by the French, failed to see that Moore had drawn Napoleon away from an expedition to the south of Spain and had bent his course westwards to the utter destruction of his plans. It is only a quaint rhyme: "Not a gun was heard, not a funeral shot," etc., that keeps his memory green even today.

As for Sir David Baird, destined to recover after an operation which was almost invariably fatal in those days and the performance of which signalized the worst kind of prognosis, he submitted with the most complete faith and fortitude to what must have been an awful ordeal in those days of no anæsthetics, buoyed up, perhaps, by the knowledge that his old comrade, McGrigor, would be waiting to greet him and treat him when he got to shore! It is irrelevant, perhaps, to quote these tales of gallantry in a sketch such as this but the very word *Coruna* must be my excuse!

McGrigor was kept fully employed by the ordeal that was his own in the sense that he was the man responsible for the disembarkations at Portsmouth. "Mr. Knight sent down the medical officers of the Household

Troops and of most of the Militia." McGrigor engaged such civil practitioners as were available. Everything that could be thought of was done. But still the numbers of typhus cases continued to increase. Haslar Hospital took nearly 4,000 cases. Floating hospitals were taken over by the Army for the worst cases. Two Deputy Inspectors of Hospitals were sent to Portsmouth under McGrigor's orders. But, in spite of all this accession of medical strength, the typhus continued. A very serious complication, a mixture of typhus and pneumonia became prevalent. Mr. Knight himself finally came down to take charge himself and was met by McGrigor who had daily parties of officers to meet him—but he only remained a few days and returned to London "to make his report to the Duke of York and to express his satisfaction to His Royal Highness with what had been done." It only remains to tell one funny story about Haslar Hospital. There was a very correct and almost prim old retired Naval Officer in charge. The old gentleman told the Sergeant of the Guard that he was entitled to "a march by Beat of Drum" as well as by the Guard turning out. The Sergeant applied to the officer on duty, a young Irishman with a sense of humour. "Certainly," said he, "play him the Rogue's March," which was actually done, all persons being satisfied!

Here ends the manuscript as left by Colonel Lyle Cummins.

Correspondence

DEAR SIR,

An unquenchable hope of starting a lively correspondence in the *Journal* exposes me to the risk of being thought contumacious and self-opinionated, so I persuaded Lt.-Col. P. L. E. Wood, whose views largely coincide with mine, to write a criticism of the views of the Southern Command Medical Study Week (*Journal*, February 1949). As he is a busy physician his letter never got beyond a rough draft. General Dowse's very interesting article (*Journal*, October 1949), however, renews the need for discussion of some points concerning the deployment of Field Ambulances about which I know the views of my fellow divisional A.Ds.M.S. (Cols. T. F. M. Wood of 2 Div. and J. B. Macfarlane of 40 Div.) differ from those expressed in the two articles.

To the Hartgill Committee recommendations we owe our invaluable F.D.S. and indirectly our modern Field Ambulance; but has it given us anything else except new names for the old A.D.S. and M.D.S.?

In 1937 in a letter to this *Journal* I advocated the excision of one link from our chain of evacuation, using the Field Ambulance in the role of collection by means of a network of posts like our present Sections, and evacuation to a Dressing Station which I visualized not as a heavy rearward element of the highly mobile Field Ambulance, but as a light element thrust forward by the

C.C.S. I was therefore not hostile to the concepts of the Hartgill system as described by General Dowse, but I do not think that it worked in European warfare.

I hope that my fellow "diehard and very conservative medical administrators" will forgive me if I quote them. T. F. M. W. "The C.C.P. (old A.D.S. really)." J. B. M. "for continental warfare . . . an affair of large armies and generally narrow divisional fronts . . . the old A.D.S.-M.D.S. combination caters admirably and should not be altered . . . 'a rose by another name'." P. L. E. W. (who also used the A.D.S.-M.D.S. set up in Italy, retaining those names) "I only know one A.D.M.S. who tried the Hartgill system, and he quickly won himself a 600 bed General Hospital."

Of course one's battle experience colours one's views. One section C.C.P.s served me as well in the desert as I believe they did in the jungle; but experience in Normandy—the really horrible experience of seeing them swamped by a rush of casualties, and I had seen something not unlike it at Keren, cured me in one morning of regarding them as the normal.

The normal deployment I consider is: (a) One C.C.P. per Brigade, at Main Bde. H.Q. level, on or near the centre line, its location, etc., controlled by O.C. Fd. Amb. and/or his Coy. Commander, and consisting of at least two Sections; (b) One A.D.S. per Division at Main Div. H.Q. level, on the main administrative axis, controlled by the A.D.M.S.

There will certainly be special occasions—some have occurred in our recent exercises, and many will probably occur in the early phases of future wars when wide dispersion may be essential—when one section C.C.P.s will be necessary, and we will then be thankful for the flexibility of the Field Ambulance which General Dowse stresses. It is unnecessary to give examples of such occasions, but some of us incline to the view that when one section C.C.P.s are necessary it may often be best (despite the risk of losing two M.O.s by one shell) to have R.A.P. and C.C.P. together to avoid dispersal of force, and because a two-doctor post is so much more efficient.

I can see no reason for again changing the names of our medical posts, and risking a rise in the incidence of neurosis amongst Staff College candidates. So long as the combatants see well-signed, easily found medical posts in suitable places they don't care what we call them. "Casualty Collecting Post" exactly describes the function of such posts—places where casualties are collected into economic ambulance loads. The more of them we open the less economical is our use of ambulances likely to be. General Dowse's use of the words "the open Field Ambulance" implies a single A.D.S. open for the whole Division, which is the normal plan. For this the term "Brigade Dressing Station" is misleading. He sites the A.D.S. "in the Brigade area"; R.A.M.C. Training Pamphlet No. 2, 1943, puts it in the vicinity of Brigade H.Q.: but there are three Brigades in the Division, and to site the single A.D.S. in the area of one might be inconvenient to the others. The general area of Main Divisional H.Q. is likely to be convenient to all, and is suitable for other reasons, amongst them the difficulty of squeezing Field Ambulance H.Q. into the march tables

of an advancing division far enough up the column to enable it to get to the neighbourhood of Brigade H.Q. in time to open before battle is joined. Here however, I must admit that if the Air O.P. Flight is likely to be well in advance of Main Divisional H.Q. then the A.D.S. might have to be near that level if we eventually get aircraft for evacuation from the A.D.S., since the Divisional R.E. can hardly be expected to make special air strips for our exclusive use.

The location of the F.D.S. depends less on tactical needs than on suitable accommodation, and O.C., F.D.S., should make arrangements at the Reception Department of the open A.D.S., or of the C.C.S., whichever is the nearer, for filtering off the divisional sick and cases of exhaustion.

These suggestions for our normal deployment may be too rigid and too geographical, for in this connexion one must think less in terms of miles from the F.D.S.s, or of areas in the Division, Corps or Army, than of Travelling Time to the Surgeon. In his journey to the surgical team at or near the C.C.S. the casualty passed through two Field Ambulance posts where adjustments or additions to the R.A.P. treatment, which was sometimes unavoidably sketchy, could be made; and in practice it usually worked out that if these posts were sited as indicated above the journey was smoothly staged. Modern surgery may possibly extend the maximum time within which the casualty must reach the surgeon, and this together with air evacuation may affect the location of the forward surgical teams, and the divisional medical units will have to shape their deployment accordingly.

Many alternative methods of employing Field Ambulances can of course be elaborated, especially with the aid of diagrams in which the deployment of the Division itself is sketchily represented by such airy generalities as "Troops in the Line"—(Is Training Pamphlet No. 2 still catering for the Thin Red Line?).

One can theorize, as I did in 1937, about doing without one link in the chain, and I have seen one or two major battles in which the A.D.S. could have been dispensed with at least in the early stages, but I believe that something on the lines suggested above was common practice in 21 Army Group and 8th Army; and when one remembers the many engagements in which we must all have seen what was really a pre-Hartgill set-up at work, with the C.C.P., the A.D.S., and the C.C.S. all hard at it, all clearly doing necessary jobs and doing them well, and all apparently just where they were tactically required, one hesitates to lay even a diagrammatic finger upon any of the old and well tried links in the chain.

If the Bible of the True Faith is Training Pamphlet No. 2, with the Gospel according to S. Command, and the Epistle of General Dowse to the Collegians, then this is heresy—but I think it will be found that the heretics are many, and securely entrenched even in episcopal appointments.

I entirely agree with the measure of responsibility which General Dowse gives, despite a note of caution on p. 178, to Field Ambulance Commanders. Most battles are fought as Brigade battles and O.C. Field Ambulance is the best man to control evacuation from his Brigade, within the framework laid

down by the A.D.M.S. As an O.C. Field Ambulance I found it best to live at Main Brigade H.Q. during battle, but perhaps the new Company H.Q. organization will make this less essential.

General Dowse puts certain problems for our consideration.

The question of the replacement of Regimental stretcher bearers and the drivers of medical vehicles by R.A.M.C. men has twice been referred to divisional A.Ds.M.S., in 1946 and 1949. On both occasions I found that the weight of opinion amongst combatant officers and medical officers with much divisional experience in the last war was against these proposals.

Although there may be no technical objection to continuing as far as Field Ambulance Company Headquarters and the R.A.P.s the wireless frequency allotted to the medical services, the problem will be the provision of trained men with a high sense of signals security to operate the additional sets.

For a short time as an A.D.M.S. I had a Rover set but the bother of operating it inclined me rather to use the nearest set at a Field Ambulance or Brigade H.Q. Whatever sets we have must, I think, be manned by Signals operators. We cannot add this highly specialized trade to our R.A.M.C. training commitments, and, quite apart from the fact that the enemy gets his most valuable information from intercepts of administrative nets. an indifferently operated net is worse than useless.

Like General Dowse I am surprised that the location of the A.D.M.S. and his staff at Main Divisional H.Q. is not yet officially prescribed despite the statement in the Report of the A.M.D. Committee on Post-war Field Medical Organization that at Rear H.Q. "no A.D.M.S. can function efficiently during active operations." Of the many arguments in support of this the one which often appeals to logically minded staff officers is as follows. R.A.S.C. and R.A.O.C. collect material from the rear and deliver to the forward area. R.A.M.C. and R.E.M.E. collect casualties from the forward area and convey them to the rear. Experience has proved that this R.A.M.C. work can be properly controlled only from Main Divisional H.Q., whereas C.R.A.S.C., C.R.A.O.C. and C.R.E.M.E. all prefer their H.Q.s to be at Rear H.Q. The problem of the C.R.E.M.E. resembles our own, L.A.D.s correspond to R.A.P.s, but he has no C.C.P.s and his Brigade Workshops are normally set further back than our A.D.S. Were we to have our own H.Q. like theirs (C.R.A.M.C., etc.) our position at Main Divisional H.Q., which is now accepted in all enlightened Divisions, might be imperilled. Even the addition of an A.D.D.S. as suggested in the Southern Command article might be dangerous, and I for one do not support this. Excellent results were given by using the senior mobile dental team officer in an advisory capacity.

The D.A.D.A.H. can well be at Rear Divisional H.Q. provided his need of an office is catered for by a 15-cwt. truck with penthouse. or by the prescriptive right to a share of the office of the D.A.A.G. or D.A.A.G. (Health Discipline).

With this exception an A.D.M.S. is justified in saying to the Divisional Commander "If your A.D.M.S. and staff are to be at Rear Divisional H.Q.

Sir, he will NOT be ME." ("ME" sounds so much better than "I," and when moved by profound emotion one is seldom pedantically grammatical.)

Comments on General Dowse's last problem can best be made by those with jungle warfare experience.

"Sand in your shoes" was the 1944 taunt when anyone spoke of the desert, and in 1945 those whose war experience was confined to Europe would dismiss as Bush whackers men whose knowledge of Air evacuation and of the intricacies of Air Supply must put the Bocage Bores in the beginners' Class.

If we do get our own ambulance planes it must be remembered that we may still have to use returning empty transport planes, just as in emergency we may use returning empty supply vehicles, and, in forcing the passage of land or water obstacles, returning A.P.C.s, L.Vs.T., and D.U.K.W.s. In the design of new A or B vehicles and planes the possibility of their occasional use for stretcher carrying should always be kept in mind.

I mentioned this point in a letter to the Journal (January 1949, p. 49) which did not start the correspondence which I hope that this one will; for these points need to be discussed if our training is to be on sound and more or less generally agreed lines.

I am, Sir,

Yours, etc.,

F. M. RICHARDSON, *Colonel.*

January 27, 1950.

[Further correspondence is invited. Letters should be short—preferably from 500 to 100 words.—ED.]

DEAR SIR,

When recently perusing original reports in connexion with the Medical History of the War, I came across a note by the D.D.M.S., Brigadier D. T. M. Large, on the subject of hill-stretchers (i.e. stretchers for evacuation in hilly country).

He mentions the "Thomson-Hill" stretcher and comments that it was too heavy and cumbersome.

This hill-stretcher, which should have been noted as the "Thomson hill-stretcher" (i.e. for use on hills and mountains), was designed at Razmak on the Indian Frontier for the very work of evacuation from such country as that encountered in the Campaign in Greece. It was, therefore, made light, handy and almost flimsy looking but did its job in several short campaigns on the Frontier with success. The original models weighed 9 lb., were deliberately made with a two-piece socketing single pole and were so easily carried on the back over normal equipment that the S.B. had both hands completely free for rock climbing; while two stout S.B.s could bring the casualty downhill.

This could hardly be called "too heavy and cumbersome."

It was in the hands of "Ordnance" that the stretcher was "*improved*"? and "modified" so that it attained a weight of 18 lb. and finally, I believe, 24 lb. Perfectly ridiculous etceteras were added, such as large "turks heads," to prevent the loops slipping, whereas all that was wanted was a single rope knot, and a large metal pin to hold the jointed ends together, whereas *no pin* was ever required because it would be a physical impossibility for the socket to come undone once the patient was in the sling-stretcher.

It was the Ordnance pattern with unnecessary *improvements* (?) which made the Thomson hill-stretcher too heavy and cumbersome.

I suggest that for future use something approaching the original production and pattern should be used.

Yours faithfully,

TREFFREY O. THOMPSON,
Lieutenant-General.

February 6, 1950.

In a letter to the Editor Brigadier D. T. M. Large comments:

. . . He agrees that, as modified by Ordnance, it is, as I commented, heavy and cumbersome. . . . It is much too heavy to be of any value at all and I agree with him that something much lighter and flimsier is required. The present modification, as sent to us in Greece in 1941, is fit only for the rubbish heap.

By the way, I saw some very interesting stretcher work in Austria recently, both in actual casualties among skiers—which were frequent this year—and in connexion with the training of the Chasseurs Alpins, who were occupying that part of Austria. This ski-stretcher is just a long flat wicker-work basket, on which the casualty lies, and is fitted with several steel bands underneath to act as runners. One bearer skis in front, braking all the time on his skis, and one behind, braking hard, while the stretcher itself just skids on the snow.

I have seen these things go down very fast in charge of trained guides over places where I would hardly dare to ski. They were in daily use and seldom a day passes without one seeing two or three broken legs brought in on them. The patients are comfortable enough, which is as well, as there is no other possible means of evacuating them from the higher snow slopes.

[Brigadier Large does not tell us how this contrivance is secured to the skiers—presumably there is some material connexion.—ED.]

Obituary

Lieut.-Colonel BURNET GRAHAM PATCH

It is with deep regret that we record the death of Lieut.-Colonel B. G. Patch which took place at Chichester on February 4, 1950, in his seventy-fifth year.

He was first commissioned on January 31, 1903, and reached the rank of Lieutenant-Colonel on January 16, 1926. He retired in October of 1930 and held Retired Pay appointments at Dunbar and, later, Chichester where he remained until 1946. While in India he took part in the Mahsud and Waziristan Campaigns—1919–1921.

He served, *inter alia*, at Poona and Rawalpindi where he and his wife were deservedly popular. They will long be remembered by their many friends as exceptionally thoughtful and generous hosts.

At Rawalpindi he was an "E.N.T." specialist of high repute. It is believed that he was the first officer to be permitted to remain employed at his speciality after promotion to Lieutenant-Colonel. He was further distinguished by becoming a grandfather while still a serving Major—a happening which caused him considerable pride.

Quiet and unassuming in manner he was conscientious and thorough in all that he did and was full of sage advice when such was sought.

We extend our deepest sympathy to his widow and the members of his family who are mourning the loss of one who never spoke, or had spoken of him, an unkind word.

Lieut.-Colonel W. J. S. HARVEY, D.S.O.

We regret to record the death of Lieutenant-Colonel W. J. S. Harvey, D.S.O., R.A.M.C., Retired, which took place on February 23, 1950.

He was born on May 18, 1874, qualified L.R.C.P.Lond., M.R.C.S.Eng. in 1898, and was commissioned as Lieutenant on January 14, 1902. He was promoted to Lieutenant-Colonel on December 26, 1923, and retired on May 18, 1929.

He served in France from July 1915 to October 1919. Five times mentioned in despatches he was awarded the D.S.O., the French War Cross, 1914–15 Star, British War and Victory Medals.

Brigadier CUTHBERT SCALES, M.C.

We regret to record the death of Brigadier Cuthbert Scales in London in December 1949 after a serious illness. Scales, an Edinburgh graduate, was first commissioned on October 2, 1914. In due course he reached the rank of Colonel in 1944 and retired with the honorary rank of Brigadier on July 21, 1948.

In the first world war he was awarded the Military Cross and later a Bar, for continued acts of conspicuous gallantry while in charge of stretcher-bearers under intense machine-gun and rifle fire.

He had served in the Afghan Campaign of 1919 and in the recent war in Persia/Iraq and in the Middle East.

He was a man with many friends who were grieved to hear of the serious illness which had necessitated weeks of hospitalization and left him seriously disabled before his death.

Notices

NOTICE TO RETIRED OFFICERS OF THE R.A.M.C

THE King has recently approved the wearing of swords at ceremonial parades. It will be necessary, therefore, for officers of the Corps to wear swords on these occasions, but the regulation states that officers will not be required to put themselves to the expense of buying a sword for the purpose. In order to meet this need it is proposed to form a pool of swords at the R.A.M.C. Depot at Crookham, which could be borrowed by any officer when on parade.

The Director-General asks whether retired officers of the Corps would be able to help in this matter by letting the Commandant of the Depot know whether they would be willing to donate a sword for this very useful purpose. The type required is either the old or new pattern sword and with either a leather or steel scabbard. Perhaps if we have a surplus of the old pattern swords they would look very handsome in the R.A.M.C. historical museum, which it is proposed to establish at the Depot. If desired it would be arranged that the officer who donated the sword would be remembered by name.

CORPS WEEK, 1950

THE main events of Corps Week are as follows:

Tuesday, June 20: Cricket—R.A.M.C. v. R.A.O.C.
 (10 a.m.–6 p.m. at the Depot).
 Swimming Gala
 (7 p.m. at Aldershot Command Swimming Baths).
 After the Gala The Officers McGrigor Mess will be
 “At Home” to officers and their families attending the
 Gala.
 There will also be an all ranks dance at No. 1 Company.

- Wednesday, June 21: Cricket—R.A.M.C. v. United London Hospitals
(10 a.m.—6 p.m. at the Aldershot Officers' Club).
R.A.M.C. Officers' Ball
(9 p.m. to 1 a.m. at the Aldershot Officers' Club).
- Thursday, June 22: R.A.M.C. Annual Sports Meeting
(11 a.m.—5 p.m. on the old Corps Ground, Queens
Avenue, Aldershot).

Tickets for the Swimming Gala and the Officers' Ball may be obtained from the A.D.M.S., H.Q. Aldershot District, Steele's Road, Aldershot.

Officers and their families do not require to apply for tickets to attend the Annual Sports. Tea tickets will be issued at the entrance to the Officers enclosure. Applications for tickets for the W.O.s and Serjeants' and other ranks enclosures should be made to the R.S.M. and P.R.I. of the Depot respectively at Queen Elizabeth Barracks, Crookham, near Aldershot, Hants.

All members of the Corps, past and present, are reminded that no invitations are being sent out within the Corps.

ROYAL ARMY MEDICAL CORPS OFFICERS' "AT HOME" 1950

AN "AT HOME" for Regular Officers, past and present, of the Royal Army Medical Corps, including Officers holding Short Service Commissions, and their wives and families, will be held at the Headquarter Officers' Mess, Millbank S.W.1, on Friday, June 23, 1950, from 4 p.m. till 6 p.m.

It is emphasized that admission will be on production of ticket only.

Tickets, for which no charge is made, are limited in numbers and will be allocated in order of application.

Requests for tickets should be made as early as possible to the Honorary Secretary of the Mess.

ROYAL ARMY MEDICAL CORPS OFFICERS' ANNUAL DINNER, 1950

THE Annual Dinner for Regular Officers, past and present, of the Royal Army Medical Corps, including Officers holding Short Service Commissions, will be held at the Connaught Rooms, Great Queen Street, Kingsway, W.C.2, on Friday, June 23, 1950, at 7.30 p.m. for 8 p.m.

President: THE DIRECTOR-GENERAL, Army Medical Services.

Dress: Evening Dress with decorations, dinner jacket with miniatures.

No. 1 dress, undress uniform or service dress.

Separate tables will be reserved for parties of eight or more officers who wish to dine together if notification is received before June 10, 1950. Other officers should indicate with whom they would like to sit and every endeavour will be made to meet their wishes. The seating plan will be on view in the Headquarter Mess at lunch time on June 23, 1950.

Early application for tickets, price £1 1s. 0d. each, accompanied by remittance to cover the cost of tickets required, should be forwarded to the Honorary Secretary, Headquarter Officers' Mess, Millbank, S.W.1.

JOURNALS RECEIVED

<i>Journal of R.A.S.C.</i>	February 1950
<i>Clinical Journal</i>	February 1950
<i>Journal of Royal Institute of Public Health and Hygiene</i>	February 1950
<i>St. Bartholomews Journal</i>	February 1950
<i>South African Medical Journal</i>	January 1950
<i>Medical Press; Journal of Royal Navy Medical Service</i>	current numbers
<i>Medical Journal of Australia</i>	December 1949
<i>Indian Medical Gazette</i>	October 1949
<i>British Medical Journal</i>	February 1950
<i>Revista de la Asociacion Medica Argentina</i>	December 1949
<i>Military Review; Yale Journal of Biology and Medicine; Chronicle of World Health Organization</i>	current numbers
<i>South African Medical Journal</i>	January 1950
<i>Sanidad Militar</i>	December 1949
<i>International Health Bulletin</i>	October-December 1949
<i>Anales de Medicina y Chirurgia</i>	November 1949
<i>British Journal of Surgery</i>	current number
<i>British Journal of Dermatology and Syphilis</i>	February 1950
<i>Tropical Diseases Bulletin</i>	December 1949
<i>Arain Instituts de Medicina Tropical</i>	September 1949
<i>Journal of Royal Egyptian Medical Association</i>	November, December 1949
<i>Boletin de Sanidad Militar</i>	June to December 1949
<i>Journal of Royal United Services Institute</i>	February 1950
<i>Revista Militar</i>	January 1950
<i>Canadian Journal of Public Health; Bulletin of Hygiene; Journal of the Medical Association of Eire; Medical Journal of Australia; Lancet; British Journal of Dermatology and Syphilis; Bulletin of U.S.A. Medical Department; Glasgow Medical Journal; Post Grad. Medical Journal; Trans. and Studies of the College of Physicians of Philadelphia; Empire and Commonwealth; Bulletin of Johns Hospkins Hospital; East Africa Medical Journal; South Africa Medical Journal; Medical Press; Military Spectator; Proceedings of the Royal Society of Medicine; Transactions of Royal Society of Tropical Medicine and Hygiene; New Zealand Medical Journal</i>	current numbers

Extracts from the "London Gazette"

PROMOTIONS

- (1) *R.A.M.C. and late R.A.M.C.*
 - (a) To be Colonel:—

Lt.-Col. G. T. L. Archer, M.B.	1.2.50
--------------------------------	--------
 - (b) To be Lt.-Col.:—

Maj. J. R. Kellett, M.B.E., M.B.	7.2.50
----------------------------------	--------
 - (c) To be Majors:—

Maj. J. Aitchison (S.S.C.) (sen. 14.2.49).	23.1.50
Capt. (War Subs. Maj.) E. L. Moore	31.1.50

- (d) To be Capt.:—
 Lt. E. W. McBirney, M.B. (S.S.C.) 13.2.50
- (2) R.A.D.C.
 To be Capt.:—
 Lt. R. M. Pearson (S.S.C.) 8.2.50

APPOINTMENTS

- (a) Regular Army.
 Commands and Staff.
 Maj.-Gen. T. Young, O.B.E., M.B., late R.A.M.C., to be Director of Army Health 28.11.49.
 Maj.-Gen. J. C. A. Dowse, C.B., C.B.E., M.C., M.B., K.H.P., late R.A.M.C., relinquishes the appointment as Commandant and Director of Studies, R.A.M. College, 28.11.49.
 Brig. (T/Maj.-Gen.) J. M. Macfie, C.B.E., M.C., M.B., late R.A.M.C., to be Commandant and Director of Studies, R.A.M. College, 28.11.49, retaining the temporary rank of Maj.-Gen.
- (b) From Short Serv. Comm. (Type B) to be Capt., S.S.C., retaining his present seniority:—
 Maj. J. Aitchison, M.B. 23.1.50
- (c) From Emerg. Commns. to be Capts., S.S.C., retaining present seniority:—
 Capt. Denis Ollivere, M.B. 27.1.50
 Capt. Benson Daniel McKee, M.B. 31.1.50
 Capt. Cameron Weymes, M.B. 31.1.50

RETIREMENTS AND RESIGNATIONS

- (1) R.A.M.C. and late R.A.M.C.
 Capt. T. E. Cleghorn, M.B. 9.11.48 (Hon. Maj.)
 Col. (L/Brig.) D. C. Bowie, O.B.E., M.B., F.R.C.S.Edin. 7.2.50
 Col. V. J. Perez, O.B.E., M.D. 16.2.50 (Hon. Brig.)
 Capt. R. D. Calcott (Disability). 11.1.50
- (2) R.A.D.C.
 Capt. D. W. W. McLean 2.2.50

23
May 1950.

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MONTHLY

EDITOR

COLONEL G. W. WILL, *O.B.E.*

MANAGER

MAJOR H. W. PECK, *R.A.M.C.*

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Journal of the Royal Army Medical Corps.

Original Communications

**COLONEL PAUL I. ROBINSON, M.C.
CHIEF, PERSONNEL DIVISION
OFFICE OF THE SURGEON GENERAL U.S. ARMY**

BY

Lt.-Colonel J. M. MATHESON, M.D., M.R.C.P., F.R.C.S.Ed.
Royal Army Medical Corps
Medical Liaison Officer with the Surgeon General, U.S. Army

THERE used to appear monthly in "The Bulletin of the U.S. Army Medical Department" and there still appears in its successor (since January 1950), the "United States Armed Forces Medical Journal," a most interesting series of articles entitled "About the Medical Department," written by Colonel Paul I. Robinson, M.C., U.S.A., and other members of his Personnel Division. These popular articles describe topical personnel matters and are read with great interest by all U.S. Medical Department officers in U.S.A. and overseas; these articles are one of the more tangible ways in which the Personnel Division can share its problems with the officers for whose careers it is responsible. How a busy man such as Colonel Robinson can find time to contribute these informative monthly articles is explained by the fact that he considers it his duty and that officers have a right to expect such service. We can be sure then, that in the paper which Colonel Robinson has contributed to our Journal we will be given a most fascinating description of the organization and functions of his Division.

Colonel Robinson took his Bachelor of Science degree at Washington University, St. Louis, Missouri, where he later qualified in medicine with the M.D. degree in 1928. He then joined the U.S. Army Medical Corps and served his internship at Fitzsimons General Hospital, Denver, Colorado. In 1938, after a period at the U.S. Army Industrial College, he was appointed Fiscal Officer at the Surgeon General's Office. In 1944 he was sent to the European and Mediterranean Theatres as Chairman of the Surgeon General's Board for

planning redeployment of personnel and materiel. In 1945 he was Deputy Surgeon General for the U.S. Forces in the Far East and returned in 1946 to the Staff of the U.S. Army Industrial College. Three months later he was given command of one of the largest U.S. Army Medical Supply Depots, the St. Louis Medical Depot, from which he subsequently came to his present appointment as Chief of the Personnel Division in the Surgeon General's Office, Washington, D.C.

Strangely enough, Colonel Robinson claims no special training in personnel matters, yet he displays an awareness of the personnel responsibilities he has undertaken and has surrounded himself with experts in this field. It would seem natural that if a modern army requires, trains and uses, specialists in any of its arms or services, the procurement, careers and postings of these officers



should be managed by men properly trained in personnel management. Colonel Robinson has done much to make careers attractive in the Regular Army Medical Department and the following quotation from one¹ of his articles exemplifies the spirit of his endeavours, "Efforts must be continued and expended

¹ Robinson, Col. P. I., *Bull. U.S. Army Med Dept.*, 1949, 9, 733.

to **increase** the attractiveness of medical service in the army. Out-moded concepts **must** be replaced. The Medical Department belongs to those who are in it and **is** as good as its several components. Each year should see internal **improvements**. A stable, organized service that is acknowledged to be the best of **any** in the world is the heritage of every new officer of any of the corps of the **Medical Department**. With this beginning, progress and rapid advancement **are inevitable**."

THE ORGANIZATION AND FUNCTION, PERSONNEL DIVISION OFFICE OF THE SURGEON GENERAL, UNITED STATES ARMY

BY

Colonel PAUL I. ROBINSON, M.C.
Chief, Personnel Division, Office of the Surgeon General.

INTRODUCTION

THE belief that a satisfactory adjustment of man to his work is necessary to personal and group effectiveness is a recent and laboriously evolved concept. Support to this belief has appeared almost by chance, and in many instances has represented the by-product of a study directed toward the pure mechanics of a work situation. When man sought to find that degree of illumination which gave best production he found no relation between the two variables. When he studied the effect on worker efficiency of workday length and a changing rest period he concluded that within limits they were unrelated. A recent publication in the field of management techniques succinctly expresses the modern viewpoint; the newer meaning of efficiency is "Maximum production consistent with the abilities, energies, interests and motives of the worker."¹

A military organization is associated in the average mind with an authoritarian approach to manpower control and would be expected to delay acceptance of an advanced interpersonal philosophy. In actuality there is evidence of an early recognition of these principles by the United States Army. Older regulations stress the importance of exercising good leadership psychology and accent consideration of MAN as fundamental to operational effectiveness.

The personnel policy of the United States Army is given clarification, and assurance of general adoption, by the provisions of a Department of the Army Circular issued in 1948. This publication restates the principle that MAN is the most important single asset in any Army. The circular recognizes the dignity and importance of the individual and seeks a firm basis for an integrated team in the Department of the Army. It provides for implementing personnel utilization by affording the greatest advancement opportunity consistent with individual capacity. These provisions imply an assured career patterning in the direction of each man's interest and ability.

In June 1947 a Circular of the Department of the Army placed the responsibility for career planning of all Medical Department personnel with

¹ Ghiselli, E. E., and Brown, C. W., *Personnel and Industrial Psychology*, McGraw-Hill Book Co. Inc., 1948, p. 15.

the Surgeon General. Under this authority, basic career patterns were prepared for officers of the Medical Department.

These personnel principles and attitudes once accepted, provided the pattern for the development and organization of the Personnel Division of the United States Army Surgeon General's Office. The structure achieved has evolved logically from the discharge of the functions inevitable to the acceptance of this man-centered personnel attitude.

ORGANIZATION OF THE PERSONNEL DIVISION

The Chief of the Personnel Division is staff advisor to the Surgeon General on medical manpower problems and is the operational head of the Division. He directs the activities of the several Branches of the Personnel Division and correlates divisional work with the medical needs of the Department of the Army. The policies under which the Division operate are those consistent with Department of the Army directives. These in turn proceed from the laws passed by Congress, and from the Executive Orders of the President of the United States.

Direction and integration is given the Division operation by daily conferences with Branch heads. The chief of the Division establishes policy in controversial areas and provides decision in matters not clearly covered in standard procedure.

The chief of the Personnel Division maintains the necessary liaison with other Divisions of the Surgeon General's Office to effect a concerted approach to the problems of personnel administration.

In the discharge of his responsibilities the chief of the Personnel Division has established two units and five branches, and uses a Technical Information Office, in organizing the operation of his Division.

These subdivisions fall easily into the three functional categories of Administration and Staff, Career Management, and Officer Procurement. An additional few are grouped as Miscellaneous. This functional approach to a discussion of the Personnel Division provides the following outline:

1. Administration and Staff Function
 - a. Division Service Unit
 - b. Personnel Authorization Unit
 - c. Plans and Policy Branch
 - d. Technical Information Office
2. Career Management Function
 - a. Career Management Branch
3. Officer Procurement Function
 - a. Officer Procurement Branch
4. Miscellaneous Functions
 - a. Civilian Components Branch
 - b. Civilian Personnel Branch
5. Summary

Through the correlated operation of these subdivisions the various personnel functions of procurement, classification, assignment, career management and promotion are accomplished.

ADMINISTRATIVE AND STAFF FUNCTION

The initial group of subdivisions provides services, and technical advice and information, to the chief of the Division and his Branch heads.

The first of these, *the Division Service Unit* performs the administrative details, and maintains the necessary files, to assure the ordered internal operation of the Division.

The Personnel Authorization Unit operates to provide statistical information concerning personnel authorized and available for staffing the medical installations under the Surgeon General's control. Personnel requirement calculations are based on Unit field surveys and on information gained through correspondence and discussion with installation commanders. Personnel estimates are then related to overall manpower availability and to fund allocations. The Personnel Authorization Unit head may represent the chief of the Personnel Division on authorization matters before the Army General Staff.

An important member of this first functional group is the *Plans and Policy Branch*. This branch coordinates, and may initiate, studies and correspondence pertaining to personnel of the Medical Department with particular reference to assuring a consistent and intelligent policy attitude.

This branch is essentially the fact-finding and planning unit on Medical Department personnel policy matters within the Surgeon General's Office. It functions to assist the chief of the Personnel Division in (1) formulating plans and policies of a Medical Department personnel nature; (2) preparing Medical Department personnel sections of other plans; (3) coordinating plans affecting personnel with other divisions of the Office of the Surgeon General; the Department of the Army; and other Armed Services; (4) conducting field liaison on personnel matters; and (5) maintaining files of correspondence peculiar to Medical Department personnel policy problems.

The Plans and Policy Branch assignments are directed by the chief of the Personnel Division. Though diverse in character, assignments may be categorized into three major divisions: (1) Mobilization Planning, (2) Personnel Procurement, and (3) Personnel Legislation and Management. Informal staff conferences are a preliminary phase of project planning to determine appropriate approach. Completed studies undergo branch staff discussion prior to submission to the Division chief.

Much of the daily work of this branch is with current problems confronting the Medical Department. The true effectiveness of such a unit, however, is in its contribution to long-range planning in the areas of Division responsibility.

The Technical Information Office is normally a part of the Executive Office of The Surgeon General. The public relations aspects of personnel procurement

necessitates an additional chain of responsibility between this office and the Personnel Division. The branches of the Division are thus served by public relations specialists in preparing informational releases or in planning major personnel actions. This tends to assure favorable individual and group reaction to policy change and action decision.

THE CAREER MANAGEMENT FUNCTION

The second of the Division functions centers about the *Career Management Branch*. This branch chief directs the activities of the branch in accordance with the policies in force. Inasmuch as these policies seek continued growth and development to each military medical career this branch logically becomes central to many Division activities. In discharging this pivotal responsibility close liaison is maintained with other Divisions of the Surgeon General's Office. This assures a comprehensive policy form to final operational activity.

The Career Management Branch has five principal sections: Career Guidance, Personnel Actions, Personnel Records, Army Nurse Corps and Warrant Officer Enlisted Sections.

The Career Guidance Section chief studies the individual officer, develops his career pattern, and makes recommendations for a training or duty assignment in line with his demonstrated ability and interest. The type of training provided varies with current and projected estimates of manpower needs in the installations under the control of the Surgeon General.

An exact system defining the degree of specialty training possessed by an individual, as well as one defining the degree needed in a given job, is necessary to intelligent assignment in a training or duty position. Good classification is also necessary in determining manpower needs. The Surgeon General's Office utilizes such a system.

In classifying Medical officers the nomenclature used in civilian practice serves as a base. Officers are then sub-classified as A, B, C or D specialists. This permits a categorizing of physicians scaling from the authority in the field to the young officer completing a first year residency. Positions can also be classified as ones entailing great responsibility or ones requiring less skill. This facilitates a discriminating selection.

Career Guidance is the subject of a later paper and is in consequence covered only briefly here.

The Personnel Actions Section is the executive section of the Career Management Branch. The mission of this section is to effect assignment and reassignment action through the Office of The Adjutant General. In discharging this function the section employs a system which assures continuing control.

This Control and Statistical System, a method of fully utilizing records operates to assist the section in determining proper station assignment. It assures logical, accurate and economic distribution of Medical Department Personnel based on global requirements. The system enables the Personnel

Actions Section to keep a running inventory on the world-wide strength requirements and on personnel availabilities. Based on this information personnel are assigned in accordance with their classification and career pattern to specific specialty vacancies. Assignments are projected from four to six months in advance and maximum assignment stabilization is achieved.

Morale has improved through a careful advance weighing of the personal aspects of assignment. Additional results have been to give encouragement to recruitment and to materially reduce problems arising in connection with permanent change of station.

Some assignment problems are those concerned with movement of household goods and dependents, and with availability of quarters or schools at the new station. Problems may arise in connection with a misinterpretation of permanent change of station orders. Many of these problems are rendered minimal by the advance notification of change of station allowing an adequate period for correspondence and readjustments.

The Records Section of Career Management Branch, functions to maintain records and information on an officer's status and qualifications. Four basic records are maintained for each individual officer: A Status Card is used for filing administrative information available at the Department of the Army level. Information derived from Department of the Army orders directing transfer, promotion, and assignment are posted to this record. An officer's Qualification Card records changes reported from the field and data on physical status, decorations, marital and dependency status, education and duty assignments. The Efficiency Report prepared by the officer's immediate superior is completed and forwarded to The Adjutant General. This rating is scored, and photostated copies are furnished to the Records Section to be filed in the Officer's Efficiency File. An Officer's Preference Card is accomplished annually and expresses his wish as to assignment or training. This is filed in the Records Section and serves the Career Management function. These four records are basic to personnel administration.

One of the most significant advances in personnel management in the post-war period has been the development of mechanized personnel accounting. Formerly manual, complicated and laborious systems, expensive in personnel and time, provided essential information upon which to make assignment and reassignment, chart careers and provide data for promotion, retirement and statistical studies.

Through the adoption of a punch card business machine system it is now possible to tabulate thirty items of essential information on one horizontal line. The versatile capabilities of sorting, reproduction, and comparative analysis under this system are almost limitless. Conventional rosters by corps, grade, and professional qualification are reproduced monthly for assignment purposes, retirement forecasts and statistical needs.

As a contribution to improved personnel management, increased efficiency and saving in time, this machine conversion has more than justified the effort.

The Army Nurse Corps Section of the Career Management Branch, functions to administer both the *guidance* and *actions* activities for officers of the Army Nurse Corps. It operates under the same general policies which are applicable to other Medical Department officers.

A Promotion Unit, operating directly under the Branch chief, processes promotion recommendations and handles correspondence pertaining to the promotion of Medical Department officers. The unit maintains liaison between the Personnel Division and the various Medical Department Promotion Boards. This unit also processes applications for release from duty by Medical Department officers.

A Warrant Officer and Enlisted Section studies and recommends policies affecting these categories. The section interests itself in the classification, assignment, career guidance and proper utilization of Medical personnel of enlisted or warrant officer grade.

THE PROCUREMENT FUNCTION

The *Procurement Branch* administers Personnel Division activities calculated to bring sufficient numbers of officers into service to staff the installations and activities under the control of The Surgeon General. Two approaches are utilized in this procurement function. One is based on the orientation and education of medical men and students in the advantages of a military medical career. This process is carried out by pamphlet and brochure distribution to physicians, students, and professional groups and through correspondence and direct consultation with individuals and groups.

The other procurement method offers approved training as an intern or resident in return for a period of obligatory service in a duty assignment with the Army.

Officer Procurement Branch, in addition to processing initial inquiries on appointment, active duty call, or training request, guides all applications through the Branch and Board proceedings within the Surgeon General's Office following the administrative approval in The Adjutant General's Office.

The Branch operates through four sections: The Regular Army Appointment Section, The Reserve Officers Appointment and Recall Section and the Sections on Professional Programs for Medical, Dental and other officers.

The Regular Army Appointment Section processes applications for Regular Army for all Corps of the Medical Department. Individual applications go to designated General Hospitals, where initial evaluation is made by a Board of officers. The Board findings are sent to The Adjutant General. The Adjutant General returns cases to the Regular Army Appointment Section for professional, and physical, eligibility determination. A Central Medical Department Board of The Surgeon General's Office considers applications and makes recommendations on acceptability and grade. The applications, together with a nomination list are returned to The Adjutant General, who transmits

the list to the President of the United States for signature and Senatorial confirmation.

The Reserve Officer Appointment and Recall Section processes correspondence and applications on appointment of new Reserve officers and their call to active duty. Reserve officers include Medical, Dental, Veterinary, Medical Service, Army Nurse, and Women's Medical Specialists Corps. The section corresponds with applicants and conducts personal interviews. After applications come from The Adjutant General's Office they are processed in this section and submitted to a Board of officers for recommended action. Completed cases are returned to The Adjutant General for appropriate orders.

The Medical Professional Program Section operates to attract medical graduates to a career in military medicine. Four basic training programs are in effect. Two involve training in civilian institutions as intern or resident. In the other, similar training is given to Medical Officers in Military General Hospitals. Those selected for the civilian internship program are commissioned in the Medical Corps Reserve and receive the full pay and allowances of a First Lieutenant. Military and civilian hospital residencies are open to Regular Army officers only. An obligatory period of Army service follows for all who enjoy the advantages of the programs.

The programs are approved and meet the standards of the American Medical Association and the American Specialty Boards. Regular Army officers may be selected for training in either military or civilian institutions on a one year contractual basis and are expected to advance through the years of training required for specialty board certification. The program is devised for officers of the Regular Army serving careers in military medicine. Assignment is in the field in which the officer is trained.

The Army Medical procurement programs are intended to assure a continued high standard of medical service. They are expected to provide a strong basic force capable of expansion in emergency.

The Dental Professional Program Section processes applications for the training programs offered by the Army Dental Corps. The Army Senior Dental Student Program subsidizes students in the last year of their studies. The Dental Intern Program affords graduate training with the Army and attracts officers to a Regular Army Dental Career. The internship is fully approved by the American Dental Association.

Senior dental students appointed as Second Lieutenants, Medical Service Corps, continue their studies in their respective schools as officers on active duty with full pay and allowances. Upon graduation the student accepts an appointment as First Lieutenant in the Dental Corps Reserve, and serves on a duty status at an Army installation for two years.

The Dental Professional Program Section handles inquiries about Dental Corps Reserve, active duty and appointment in the Regular Army Dental Corps.

Programs are provided for practice training in Dietetics, Occupational Therapy and Physical Therapy, the subsections of the Women's Medical

Specialists Corps. In the Medical Service Corps, Programs are offered leading to the degrees of Doctor of Philosophy in Clinical Psychology and to a Master's in Psychiatric Social Work.

MISCELLANEOUS FUNCTIONS

The *Civilian Components Branch*, Personnel Division, studies the adequacy of Medical Department officers and Medical type units in the organized Reserve. Liaison is maintained with agencies concerned in Reserve training programs. Studies implement proposed Reserve legislation, and incorporate recommendations in the areas of pay, organization, training and equipment. Matters requiring Congressional study and approval may be given preliminary analysis by this branch. Requirements of Medical Department officers and units are determined and an index of Reserve Medical officers is maintained indicating their specialist rating.

The Civilian Components Branch acts as liaison in Reserve affairs between the Office of the Surgeon General and the General Staff, U.S. Army, the Army Field Forces, the Army Air Forces and the National Guard Bureau. In coordination with the General Staff studies are accomplished on the problems of the special units affiliated with civilian medical schools and hospitals.

The *Civilian Personnel Branch* of this Division operates to provide Civilian personnel to the Department of the Army Medical Service. Utilization studies determine needs which can be filled by civilians.

The Chief of the Civilian Personnel Branch supervises and administers the procurement, placement and utilization of the civilian personnel used in Medical activities under the control of the Surgeon General. He assures observance of the laws and regulations pertaining to this category of employees.

SUMMARY

In conclusion, the Personnel Division of the Surgeon General's Office, United States Army, is organized to discharge the duties imposed upon it by the personnel policies of the Department of the Army, as they are implemented by features peculiarly Medical, contributed by the Surgeon General.

These policies, in essence, seek to make the life of a Medical Department officer as stable, as professionally interesting, and as rewarding in growth and advancement opportunities, as that of his civilian counterpart.

ACCIDENT SURGERY

BY

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(Continued from page 178)

PART II

THE TREATMENT OF FRACTURES AND DISLOCATIONS

EMPHASIS is placed on the importance of treating the patient as a whole rather than just his injured part. The aim throughout is to restore his full function, but as an intermediate measure patients are encouraged to do whatever work they can. The Almoners by their contacts with industry are able to arrange suitable work for many patients in the early stages of treatment. This has a marked effect on the morale of the injured man.

Patients are made ambulatory as soon as possible and those who may not bear weight on a limb are encouraged to walk with crutches. They are not kept in hospital unless they require special nursing or the home conditions are unsuitable. Almost all of them attend the physiotherapy department where active exercises, at first individual and then in class, form the bulk of treatment. The occupational therapy department is also active in treating mind as well as body. Several of the large industrial concerns have workshops in which the machines are specially designed to be operated by injured people. Under medical supervision they are used for exercising particular groups of muscles or for moving stiff joints. At the same time as the man is carrying out his physiotherapy he is doing useful work and is earning his pay.

Most of the fractures and dislocations are treated on orthodox lines, but always the particular circumstances of the patient are considered and the standard treatment is varied to suit his particular case. No plaster is put on without considering what useful purpose it will serve and what harm it can do by immobilizing joints. The experience gained from treating and following up such large numbers of fractures as are seen here entitles the staff to question and even to usurp "orthodoxy" in many instances. It would not be possible to discuss here the treatment of all types of injury but certain fractures particularly attract the attention of the visitor and these will be described.

Mention must first be made, however, of the open reduction of fractures. The disaster of sepsis after an open operation on a fracture or joint injury is never forgotten, but it is not a deterrent to operation when an indication to operate exists. Relying on the theatre technique and operative skill with no

touch technique throughout, sepsis is an extreme rarity. Penicillin is not used as a routine but is reserved for those cases where there is some possible source of infection. Skin preparation consists of shaving and preliminary cleansing with soap and water and drying with spirit in the ward, after which the part is wrapped in a sterile towel. In the theatre the skin is thoroughly cleansed with Cetavlon. When open reduction is indicated it is performed as soon as possible, preferably the same day, before the skin has had time to blister and the blood clot and exudates time to organize. The operation is very much easier to perform then than later. When internal fixation is necessary to obtain stability of reduction, circlage stainless steel wire and screws are used whenever possible. Plating is not popular since it tends to hold the fragments apart and prevent that pressure on the bone ends which is necessary for bony union.

FRACTURES OF THE SHAFTS OF THE RADIUS AND ULNA

The treatment of these fractures is often unsatisfactory because they are difficult to reduce by closed methods. Shortening and angulation can be overcome by steady traction for twenty minutes, but in addition the forearm must be placed in the correct rotational position. Any deviation from this correct rotation means that the fracture is not reduced and will be unstable in plaster. In addition there will be a corresponding limitation of the range of pronation and supination when the fracture has united. Mr. Mervyn Evans, a surgeon of the hospital, has pointed out that the fragments of the ulna do not rotate on each other (Mervyn Evans, 1945). All the rotation takes place in the radius. The upper fragment takes up a position which is unaffected by manipulation but which does not depend solely on the site of the fracture as is suggested by the textbooks. He has devised a method of determining the amount of rotation of the upper fragment of the radius by comparing the shape of the tuberosity with views of the tuberosity on the normal side.

In practice X-rays of the normal radial tuberosity are taken with the forearm at 90 degrees, 120 degrees, 150 degrees and 180 degrees of supination (90 degrees being the mid-position and 180 degrees being full supination). All views are taken with the elbow at a right-angle and with the tube at a fixed angle. A similar view is taken of the tuberosity on the injured side. This is then compared with the normal views and the nearest match in the shape of the tuberosity gives an indication of the degree of rotation. Having thus decided the angle of rotation of the upper fragment of the radius the patient is anæsthetized in the supine position. With the shoulder abducted and the elbow flexed to a right-angle manual traction is applied in the long axis of the forearm for fifteen minutes and at the same time the forearm is held at the predetermined angle of supination. This brings the lower fragment of the radius into the same rotational position as the upper fragment. Any lateral displacement disappears as the shortening is corrected by traction. A check X-ray is taken while the traction is still being applied and if the position is satisfactory the limb is enclosed in a plaster of Paris cast.

THE ANTERIOR MONTEGGIA FRACTURE

This fracture has been regarded as one of the most difficult to treat, but the problem of its reduction and fixation have been solved by an understanding of the mechanism by which it is produced. Mervyn Evans (November 1949) has shown by demonstration on the cadaver and by reducing a series of cases that the fracture is brought about by forced pronation of the forearm (fig. 7).

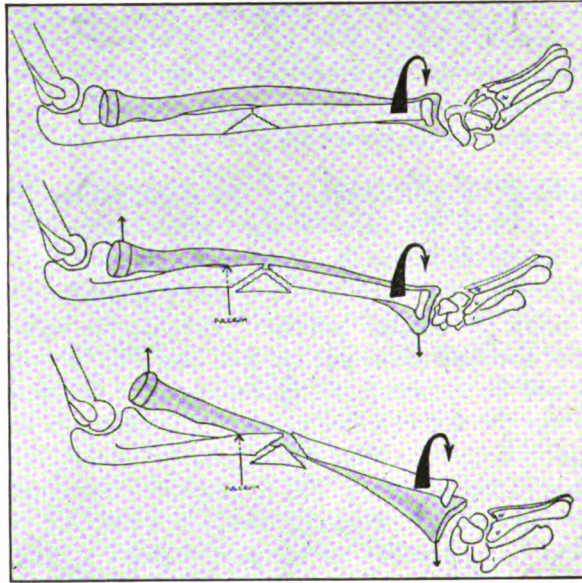


FIG. 7.—The mechanism of the anterior Monteggia fracture. (By courtesy of the *Journal of Bone and Joint Surgery*.)

The shaft of the ulna fractures and at the same time the upper fragment acts as a fulcrum on which the head of the radius is dislocated forwards. Realizing this mechanism it becomes obvious that reduction can be effected by reversing the process, i.e. by supination. To reduce the fracture traction is applied in the long axis and the forearm is fully supinated. In some cases it is necessary to exert backward pressure on the head of the radius. Reduction is maintained by fixing the arm in plaster in the position of full supination.

TROCHANTERIC FRACTURES OF THE FEMUR

The fixation of a subcapital fracture of the neck of the femur with a Smith-Petersen pin is a generally accepted treatment but the use of the Capener-Neufeldt nail-plate in the trochanteric fracture (fig. 8) is not so well known, but is the standard treatment at the Birmingham Accident Hospital. The nail-plate consists of a two-flanged nail which traverses the fracture and a plate which is fixed to the upper shaft of the femur. The nail-plates are made up

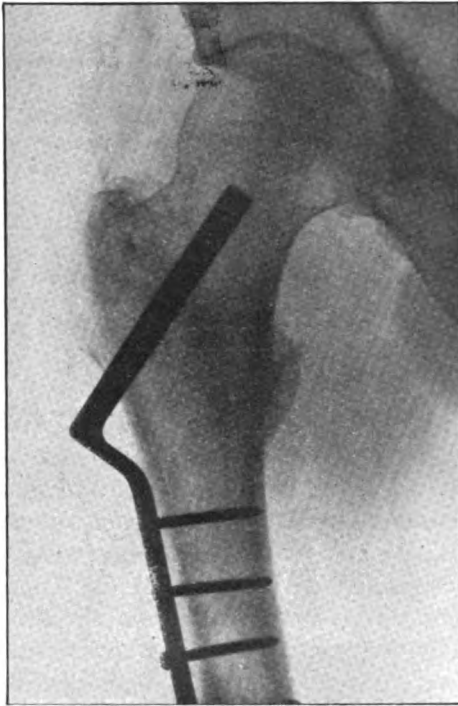


FIG. 8.—Trochanteric fracture of the femur without displacement, fixed by a Capener-Neufeldt nail-plate.

with various lengths of nail and with various angles between the nail and the plate. The correct size is chosen after considering X-rays with a guide wire in position.

The object of the nail-plate is to fix the fragments and to give stability to the fracture so that the patient can get out of bed and move about on crutches. In young people this is not important as they will tolerate treatment in bed with traction in a Thomas' splint in which the fracture is certain to unite, but in old people it is a life-saving measure. Most of these fractures occur in old people. In a series of 65 cases operated on (Mervyn Evans, May 1949) the average age was 75. These old people do very badly when confined to bed with such a fracture. They become mentally deranged and quickly develop bedsores and pneumonia. In spite of the fact that the operation is a moderately severe one necessitating a blood transfusion to combat shock, the worse the general condition of the patient the more urgent is the need for operation. The following case history illustrates this point:

A. T., aged 80. Admitted on September 29, 1948, having fallen on his right hip the night before. He had sustained a severely comminuted trochanteric fracture and there was extensive bruising around the hip. His general condition was excellent and he was

taken to the theatre the same afternoon with the intention of inserting a nail-plate. It proved difficult to secure good reduction and in view of the satisfactory general condition it was decided to treat the fracture conservatively by traction. Forty-eight hours later there was serious deterioration in his condition: he was irrational and he spent most of the first night trying to insert both his legs into one Thomas' splint. Bruising around the hip had become very marked indeed and basal pneumonia had developed. In the opinion of the anaesthetist his condition was desperate and with continued traction he was not expected to survive the week-end. The only hope seemed to be to relieve his discomfort and make him more mobile by internal fixation. The fracture was nailed on October 1, 1948. From that moment he began to improve and by the sixth day was afebrile, rational, and sitting up for several hours in a chair. He was discharged home on October 26, 1948.

(Printed by courtesy of the *Journal of Bone and Joint Surgery*.)

The policy of operating on these cases is justified by a reduction of mortality to 7 per cent compared with 16 per cent in a series of cases treated conservatively.

FRACTURES OF THE SHAFT OF THE FEMUR

The standard treatment used for fractures of the shaft of the femur is impressive in its simplicity and effectiveness. It consists of fixed traction in a Thomas' splint as originally devised by H. O. Thomas. Under general anaesthesia a Kirschner wire is inserted through the tibial tuberosity and the limb is placed in a Thomas' splint. The fracture is reduced by manipulation under X-ray control and the correct length is maintained by fixed traction from the Kirschner wire stirrup to the end of the Thomas' splint, either with a screw apparatus or with a Spanish windlass. A padded Cramer wire splint is fashioned to the shape of the normal limb from high up in the thigh to the

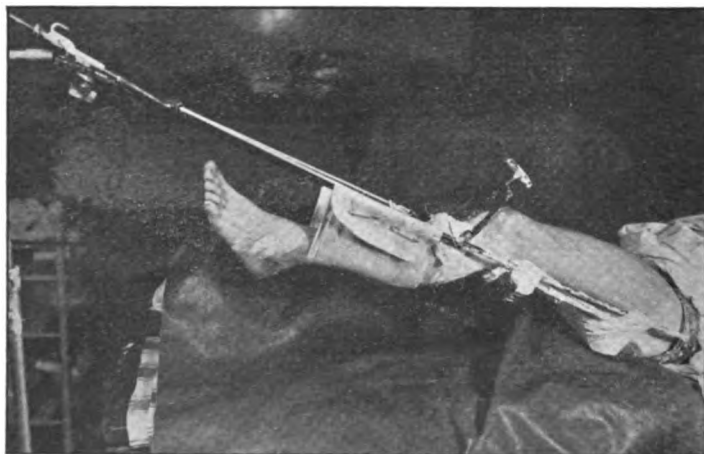


FIG. 9.—Fracture of the shaft of the femur after reduction. Note the fixed traction to the end of the Thomas' splint and the posterior splint shaped to the sound limb and fixed by plaster to the Thomas' splint. The limb has not yet been bandaged to the splint.

knee. This is used as a posterior splint to the injured thigh and is fixed in place by plaster to the Thomas' splint to prevent posterior bowing (fig. 9). Lateral bowing can be corrected by fixing a pad to the lateral bar of the splint to exert pressure on the apex of the angulation. Finally the limb is bandaged to the Thomas' splint which is suspended from a Balkan beam for ease of nursing. A weight of 5-7 lb. on the end of the splint relieves pressure on the groin. Although the knee is fixed stiffness is prevented by static quadriceps exercises. The Kirschner wire is removed after six weeks and replaced by skin traction until the fracture has united.

Charnley (1944) has discussed the mechanics of the reduction and fixation of fractures of the femoral shaft and has pointed out the advantages of this method over sliding weight traction. The latter requires continual adjustment to prevent over-distraction as exudates absorb and the tone of the muscles changes. Fixation of the knee and the back splint prevent the posterior bowing which is so commonly seen when the fracture is treated with the knee flexed.

FRACTURE-DISLOCATIONS OF THE ANKLE-JOINT

In the severe abduction-external rotation fracture-dislocations of the ankle-joint reduction by manipulation is usually possible but it is very difficult to

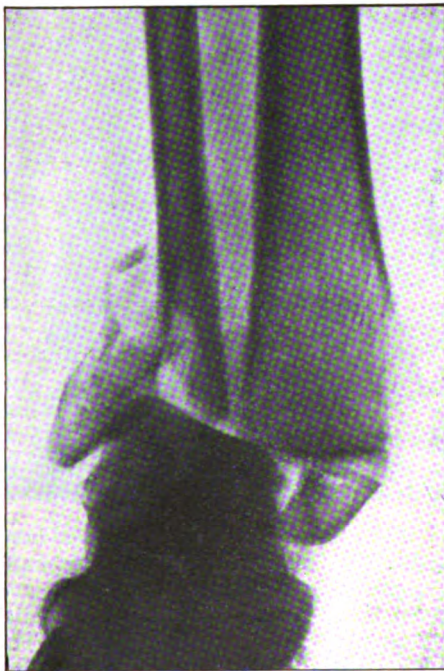


Fig. 10A.—Antero-posterior view of a tri-malleolar fracture-dislocation of the ankle.

maintain. In an attempt to solve this problem it is the practice in this hospital to operate on these fractures using a lateral approach. Through a curved incision in front of the peroneal tendons the fracture of the lateral malleolus and the torn anterior talo-fibular ligament are exposed. Mr. Gissane (in a personal communication) has pointed out that if the fracture of the lateral malleolus is accurately reduced the dislocation of the ankle mortice, together with any diastasis present, is automatically corrected. The two fragments of the fibula can easily be brought together and fastened with circlage wire. This is not enough to hold the reduction but it allows the accurate insertion of a screw through the lateral malleolus into the tibia. Figs. 10 A and B are X-rays of a severe tri-malleolar fracture which has been reduced by this method. The medial and posterior malleoli have fallen into place and their fixation is unnecessary. After operation a below knee plaster cast is applied and the patient is allowed up with crutches.

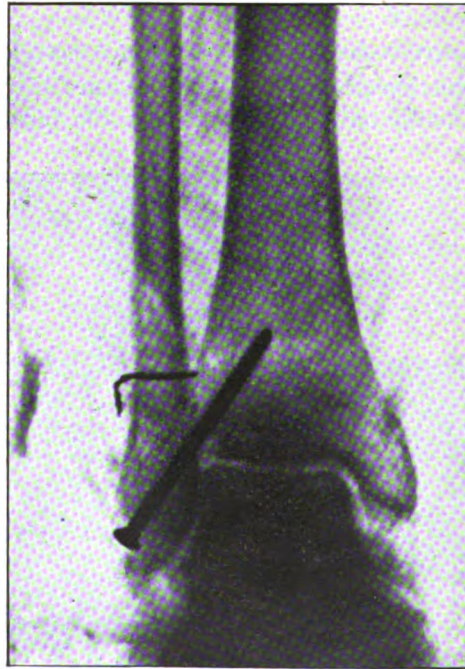


FIG. 10B.—The dislocation has been reduced by accurate approximation of the fragments of the external malleolus and fixed by a screw. Note that the medial malleolus has fallen into place. The lateral views of this fracture showed that considerable displacement of the posterior malleolus had been accurately reduced at the same time.

FRACTURES OF THE OS CALCIS

Mr. Essex-Lopresti has analysed (in a personal communication) the results of 241 fractures of the os calcis treated in the Birmingham Accident Hospital during the years 1941-48. He found that the end-results were good in that less than 5 per cent were classified as severely disabled. The method of treatment used did not seem to affect the end-result, but reduction of a fracture involving the subtaloid joint considerably cut down the period of disability. When such a fracture is not reduced the internal structure of the bone is re-modelled along the new lines of stress and it appears that the patient is not freed from symptoms until this re-modelling process is completed.

The mechanism of a fracture of the os calcis is a downward and outward thrust through the talus. In flattening out the arch of the foot the brunt of the impact is borne by the lateral side of the os calcis. The displacement of a large upper and outer fragment of the bone is a common occurrence. This is the so-called "beak" fracture (fig. 11A). Since the force is transmitted through

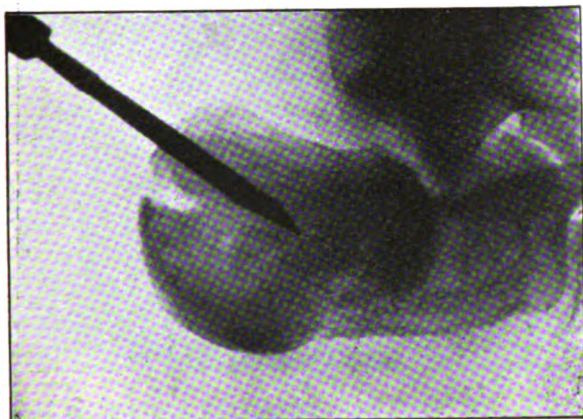


FIG 11A.—"Beak" fracture of the os calcis. A Gissane spike has been inserted into the lateral fragment.

the subtaloid joint the fracture line runs through the articular surface and in the "beak" fracture the articular part of the posterior fragment is displaced downwards into the body of the bone and rotated outwards. When the force is greater the articular surface is comminuted and a central fragment may become impacted within the shell of the body of the bone. This is well illustrated in fig. 12, which is a composite drawing by Mr. F. G. Badger, a surgeon of the hospital.

From the point of view of treatment fractures of the os calcis are classified in three groups:

- (1) *Fractures not involving the subtaloid joint and those which involve it with minimal or no displacement.*

These fractures require no reduction and the main object of treatment is to maintain the mobility of the foot during the process of union. Plaster is therefore contra-indicated. A pressure bandage is applied and the foot is elevated until swelling has subsided. Movements are started at once to prevent adhesions of the joints, to maintain the tone of the muscles and to improve the circulation. Weight bearing is not allowed until the fracture has united, usually in six to eight weeks, but the patient is encouraged to move about on crutches during this time.

(2) *Beak fractures involving the articular surface with downward displacement.*

These are reduced by Ehalt's method using a Gissane spike, which is inserted through the back of the heel into the displaced fragment under X-ray control (fig. 11b). The patient lies prone and with the knee flexed the leg is lifted vertically and suspended from two points—the pin and the toes. The weight of the limb levers the fragment into the reduced position (fig. 11b).

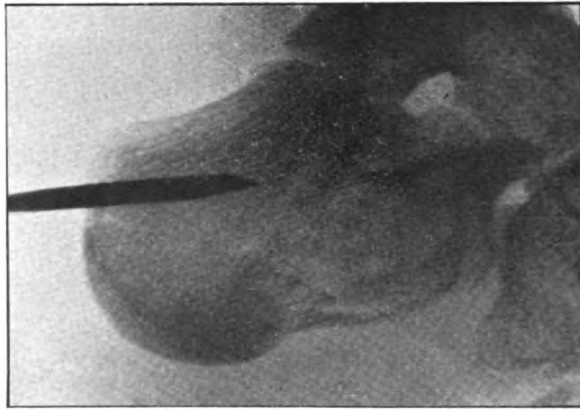


FIG. 11b.—Reduction effected by leverage on the spike.

while manual pressure on the sides of the heel corrects lateral bulging. A plaster cast is applied incorporating the pin. The pin is removed after four weeks and the plaster after eight, when movements of the foot without weight-bearing are instituted.

(3) *Fractures with comminution of the joint surface and depression of a central fragment (fig. 12).*

These fractures can be reduced only by open operation. Through a lateral curved incision posterior to the peroneal tendons, which are displaced forwards, the fracture is exposed and the central depressed portion of the articular surface is levered up into place. A Gissane spike is then passed through the body of the bone and the point of it used to fix the fragment in its reduced position. A plaster cast is then applied and further treatment follows the lines of the "beak" fracture.

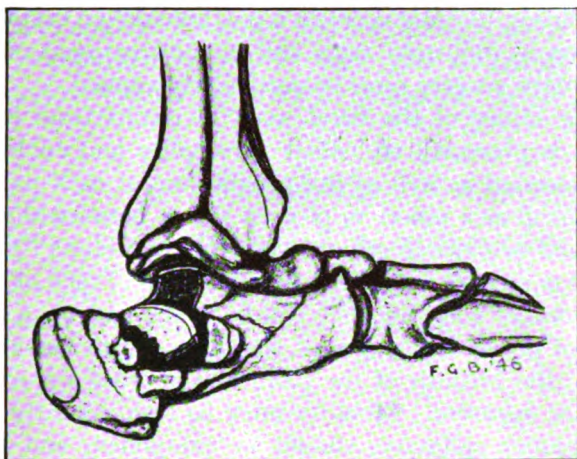


FIG. 12.—Composite drawing of a comminuted fracture of the os calcis by Mr. F. G. Badger. Note that a fragment of the articular surface has been thrust down into the body of the bone and rotated. Such a fracture can be reduced only by open operation.

SEVERE MULTIPLE INJURIES

As a result of war experience it is realized that patients with severe limb injuries even more than those with abdominal and thoracic injuries lose a large amount of blood into the tissues as well as by external hæmorrhage. When a severe case is admitted the object is to prevent shock from becoming established and this is done by large blood transfusions. Unless the case is desperate, when Group O blood is given immediately, the patient is grouped and cross-matched with homologous blood. This is important, because as much as five or even ten pints of blood may be needed and the donor serum will have an appreciable effect in the blood stream and may cause agglutination of the recipient's own cells. The transfusion is started early and continued throughout and after the operation. The amount of blood which should be given depends on the total extent of the tissue damage and, if anything, the tendency is to under-transfuse.

Mr. Ruscoe Clarke (in a personal communication) considers that if shock has once become established five pints may be required if major limb surgery is needed. In his experience most patients with severe multiple injuries have a low hæmoglobin content even after massive transfusion. It is often advisable to give a further two pints after the condition of the patient appears stabilized by clinical tests and observation.

CONCLUSION

Space has been devoted in this paper to items of particular clinical interest as recent advances. In numbers injuries of the hand form a very high proportion

of cases and it is fitting to conclude with a few remarks on major hand injuries which are common in industrial areas and in the treatment of which all the principles of traumatic surgery must be particularly applied.

When a major injury of the hand, such as results from it being caught in a power press, is presented the whole personality and environment of the patient must be assessed as well as the possible use of each part of his hand. Thinking of the hand as a pincer to pick up things between thumb and index or middle finger and as a vice to grip between the thumb and little finger across the breadth of the palm, one must estimate how much of each of these functions can be preserved and of what use they will be to the patient in his occupation. The importance of preserving length of the digits, particularly of the thumb, and of preserving the breadth of the palm and at least a stump to the little finger then become apparent. Mobility must be restored early and so tendon suture, which requires splintage, should be postponed, and a digit which, because it is badly damaged, might hold up movement of the whole hand should be sacrificed. Above all, skin cover is of paramount importance. This must be obtained, if not by suture or split skin then by plastic flaps of one kind or another. This is probably the most important principle of traumatic surgery, that immediate skin cover by preventing sepsis and fibrosis is essential to early return of function.

SUMMARY

Some impressions of the work at the Birmingham Accident Hospital are recorded, this hospital being an experiment in providing an Accident Service to an industrial area.

An account is given of the organization of the hospital with particular reference to the Casualty Department.

In the Burns Unit emphasis is laid on the treatment of shock before it has a chance to develop and the prevention of sepsis by dressing technique and by early grafting.

The open wound is treated by excision and immediate closure. The reasons for this policy and the exceptions to it are discussed.

Certain fractures are discussed. They indicate the trend of constructive thought in the hospital, using the mechanism of a fracture as a guide to its reduction and achieving stability by good anatomical reduction and internal fixation where necessary.

The treatment of shock in multiple injuries by massive blood transfusion is briefly discussed, and finally mention is made of the major hand injury.

ACKNOWLEDGMENTS

I wish to thank Mr. William Gissane, the Clinical Director, all the surgical staff of the hospital and the staffs of the Burns Unit and Medical Research Teams for their help and encouragement in compiling this paper, for giving me free

access to their cases and case histories, and for allowing me to quote from their published and unpublished works. I wish also to thank Mr. Gill of the Photographic Department for his work in preparing all the photographs and X-ray prints.

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SOME MEDICAL ASPECTS OF ATOMIC WARFARE

BY

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WHILE recent newspaper articles have stressed various possibilities of Atomic Warfare, there is still a widely held belief that nearly all aspects of this subject are shrouded in secrecy. Some of the unclassified material which is now available is to be found in the references at the end of this article and it is hoped that this may be of some use to those who wish to study the subject further.

Atomic warfare of the future may involve the use of much more powerful weapons than have so far been demonstrated [28]; but the information collected in Japan and obtained by experiment and clinical study will help to guide the preparations which must be made for such a disaster. The various effects which may be met in atomic warfare can all be studied in peacetime although on a somewhat reduced scale. Burns of all types are only too much with us and wounds of all types had been encountered for a long time before 1945. Many years separate the first radiation burns from those reported by Knowlton and others at Eniwetok [34]. Acute effects of total body ionizing radiation are discussed by Tsuzuki [48] in a paper which appeared some twenty years before his report on the Hiroshima cases.

The explosion of an atomic bomb can liberate an enormous amount of energy in an extremely short period of time [47]. The final effect will depend on the efficiency of the weapon and the conditions under which it operates; but in all cases the injuries produced can be grouped under the following three headings:

(1) *Mechanical Injuries*.—Due to blast, wounding by secondary missiles and crushing by falling debris.

(2) *Thermal Injuries*.—Flash burns, scorch burns, contact burns and burns due to secondary fires.

(3) *Radiation Injuries*.—(a) Produced by penetrating radiations and neutrons from the bomb or

(b) By radiation from radioactive substances. These substances may be fission products, unexpended fissionable material or substances made radioactive by neutron bombardment. Unlike the radiation associated with the explosion, that from radioactive substances (including those used as "poisons" in a manner similar to C.W. agents [35]), continues to be effective for an appreciable period

of time. Besides penetrating gamma radiation, the effects of α and β particles must also be considered, especially when radioactive substances enter the body.

Mechanical Injuries.—These caused the bulk of the Japanese casualties. They did not present any unusual features although, in certain cases where radiation sickness developed, slight wounds were said to break down and there was an increased tendency to gangrene. Among the survivors it was rare to find ruptured ear drums or other evidence of blast injury [30, 54]. Those subjected to very severe blast effects were usually “killed thrice over” [53]. Collapse of buildings caused the highest proportion of indirect injuries and indeed of all injuries. Fractures and the usual sequelæ of crushing were frequently met. Injuries from shattered glass were, according to the Japanese, too many to be counted. Windows were broken up to $12\frac{1}{2}$ miles from the bomb [53].

In one series of Japanese cases where burns and trauma accounted for 85 per cent of the casualties, it was found that 34·7 per cent of the traumatic cases were lacerations, 53·8 per cent contusion and 11·5 per cent more serious trauma—fractures, etc. [6]. Outside a three-mile radius there was a rapid falling off in mechanical injuries.

Burns.—In the case of an atomic explosion an enormous amount of energy is released as heat and radiated over a wide area. Where the bomb bursts at a sufficiently low altitude the heat may be sufficient to fuse tile surfaces [54].

People who were directly under the explosion were said to have had the exposed skin charred [53]. In some cases there were what Tsuzuki described as blast heat effects where corpses were found with charred skin ripped and hanging in fragments.

Most cases of burns surviving long enough to receive medical attention were relatively superficial flash burns. In such cases light shielding from clothing, etc., gave adequate protection and only directly exposed surfaces were burned [9]. Shadow effects were commonly encountered. Depigmentation and hyperpigmentation as in the “mask of Hiroshima” were among the heat effects [6]. In the Japanese cases poor and inadequate treatment intensified the plight of the casualties and keloids following the burns were common. Keloids were also found after non-atomic burns in Japanese [16].

Charring and ignition of clothing caused further burns. Where the hot cloth was tightly stretched and in close contact with the skin contact burns resulted. Dark cloth absorbed more heat than lightly coloured fabric and patterns were sometimes burned into the skin.

Burns sustained in burning buildings and other secondary fires were the same as those produced by fires of less spectacular origin.

Histological examination of the skin in cases of flash burn showed that depigmentation could occur even if the epithelium was not completely destroyed. There was marginal pigmentation and deep to the burns œdema fluid and myxomatous material were observed. Proliferation of fibroblasts and infiltration

by macrophages occurred. At a later stage the picture was often complicated by radiation effects resulting in anæmia and leucopenia with subsequent infective and hæmorrhagic changes. In these cases the absence of a normal cellular reaction was striking.

Radiation Effects.—Prior to July 16, 1945, radiation illness was not of serious military importance. It is not the main cause of casualties from atomic warfare, but it produces large numbers by ordinary standards and presents some unique features.

Acute Ionizing Radiation Illness has been caused by atomic bombs and by powerful sources of X and gamma rays [52] and its effects have been studied both in humans and experimental animals [2, 10, 12, 13, 20, 32, 36, 37, 43, 44, 48, 50]. Unfortunately the different species vary in their response to the same dose of radiation [14]. The hard X-rays and gamma rays are very penetrating and within their effective range cause marked damage to unshielded sensitive tissues. Clothing is not an effective shield although a steel helmet has been known to prevent epilation. Neutrons have a less wide effective range than gamma rays from a bomb but within that range they may effectively penetrate shielding which is adequate against the gamma rays.

Acute total body radiation produces simultaneously in all tissues varying degrees of injury, the following [20] being a grouping in increasing order of radio-resistance.

- | | |
|---------------------------------------|-----------------------|
| (1) Lymphocytes | (8) Connective tissue |
| (2) Erythroblasts | (9) Bone |
| (3) Germinal epithelium of the testis | (10) Liver |
| (4) Myeloblasts | (11) Pancreas |
| (5) Epithelium lining the base of the | (12) Kidney |
| gastro-intestinal crypts | (13) Nerve |
| (6) Germinal cells of the ovary | (14) Brain |
| (7) Basal layer of the skin | (15) Muscle |

The first eight are the most likely to show changes. In the more easily damaged organs and tissues there are more resistant cells [51] from which, if the patient lives long enough, regeneration may occur.

After exposure to massive doses of penetrating radiation vomiting and malaise usually appear within a few hours [20]. Fever and diarrhœa follow: in the most severe cases without remission. Within twenty-four hours leukocytes practically disappear, there are scattered petechiæ and rapid deterioration sets in with increasingly severe diarrhœa. Among the Japanese death in this group usually occurred suddenly from four to ten days after exposure.

In the intermediate dose range nausea, vomiting, diarrhœa and malaise usually come on a few hours after exposure. The initial symptoms subside till, after a latent period of between seven to twenty-eight days there may be gastro-intestinal disturbances with intractable and often bloody diarrhœa in most

cases. Purpura, fever and pancytopenia become progressively worse, and secondary effects of the leucopenia are laryngitis, stomatitis, pharyngitis, tonsillitis, gingivitis and ulcerative lesions of the skin and genitalia.

Death may be of the pan-leukopenic or hæmorrhagic type. In the Japanese cases hæmorrhagic deaths were most common from the third to fifth week after irradiation.

Hæmorrhagic phenomena are first seen in the skin and mucosa and are later manifested as epistaxis, melæna, hæmaturia and menorrhagia.

In this group epilation, beginning on the crown of the head, was common but was seldom complete.

In the sub-lethal dose range similar but less severe effects are met. By definition there will be no radiation deaths. The latent period is longer and those symptoms which develop are less severe. Hæmorrhagic phenomena are minimal, leucopenia and anæmia are less marked. With doses below 50 r symptoms may be absent. The only detectable hæmatological change may be a fleeting lymphopenia.

A sub-lethal dose of radiation lowers resistance to trauma and infection and prolonged avoidance of physical effort may be necessary in the more seriously damaged but non-fatal cases.

The pathology of the Japanese cases has been well described by Liebow, Warren and De Coursey [37]. The main lesions in most cases of fatal total body radiation examined may be associated with hæmorrhage, necrosis and secondary infection [49]. In the production of the hæmorrhagic state there may be a circulating anti-coagulant [2, 3, 4, 25, 18] which will add to the effects of capillary damage, and at the time that hæmorrhages are most marked there is usually a fall of platelets [18]. Anæmia results from hæmorrhage into the tissues, into the hollow viscera and from damaged surfaces, as well as from destruction of the erythropoietic elements of the bone-marrow. Erythrophagocytosis and hæmolysis probably play a part too.

Leukopenia is produced by destruction of the myelopoietic and lymphopoietic elements. The fall of lymphocytes is early [21].

Toxæmia is likely from products of tissue breakdown and absorption of intestinal toxins.

Infection is serious in these cases where the normal defence mechanism of the body is destroyed or seriously impaired [19]. A marked feature of many lesions is the absence of any cellular reaction.

HISTOLOGICAL APPEARANCE IN ATOM BOMB CASUALTIES

(1) Skin: Pigmentation and burns occurred as thermal radiation effect. Ionizing ray burns were not seen in the Japanese cases. Damaged hair follicles associated with epilation were commonest in the scalp. Vascular changes were minimal although these may be an important sequel to intense radiation.

(2) Pituitary: In some cases dying several weeks after irradiation "castration cells" were found.

(3) Adrenals: Loss of lipoid, later thinning of cortex.

(4) Heart: Epicardial petechiæ within the first two weeks—this is also seen in animals.

(5) Lungs: Only slight evidence of a primary radiation effect. Later a necrotizing pneumonia of the aplastic type was found.

(6) G.U. system: No primary effects of radiation seen in kidney or uterus. In the hæmorrhagic stage mucosal hæmorrhages might lead to ulceration with no leucocytic response.

Changes in the testes were striking and illustrate the mechanism of production of the temporary sterility common in survivors. Interstitial cells were not damaged hence loss of libido or potency would not be expected where the dose received had caused severe malaise or general debility. Atrophy was more marked in cases surviving for more than two weeks.

In the ovary the changes were less striking and primary ova were usually still present.

(7) G.I. tract: Animal work has shown that the lymphoid tissues and certain of the epithelial cells show evidence of radiosensitivity at an early stage [13] and in the Japanese cases some of the earliest gross lesions occurred here. Greenish ulcers and petechial hæmorrhages were common post-mortem findings. An important part in the production of ulcers was probably lowered ability of the intestinal mucosa to cope with bacteria together with lowered antibiotic capabilities of the blood.

(8) Lymph nodes: In cases examined from the third day onward atrophy was marked and by the second week there was disappearance of germinal centres. Later enlargement and softening of nodes was associated with hæmorrhage. This has been well shown in animals. The tonsils and other lymphoid tissue were similarly affected. Breakdown with ulceration was a secondary effect.

(9) Spleen: The lymphoid elements reacted as in the lymph nodes. The loss of white pulp was prominent, lymphocytes completely disappeared. Other features were erythrophagocytosis and formation of hæmosiderin deposits.

(10) Bone marrow: By the end of the first week extreme hypoplasia was common—gelatinous marrow. Islets of reticulum cells were found and damage was usually less severe in the shaft than at the metaphysis.

From the second to sixth week hypoplasia was the rule in those cases which died, but some showed marked reticulum hyperplasia and focal myeloid regeneration was sometimes met. In some cases marked myeloid hyperplasia occurred.

In those surviving for more than six weeks reaction and attempted recovery were the rule although there were still cases where the marrow remained hypoplastic.

(11) Liver: In cases dying in the first week some giant nuclei were seen

and there was congestion and œdema of central veins. Later fatty changes—probably associated with infection and toxæmia—were observed.

(12) Other organs: No striking changes were seen. There are no reports of the thymus but here one would expect destruction of thymocytes as is seen in animals. Loss of adipose tissue became more marked in the cases dying after a prolonged illness. Recently cataracts have been observed in Japanese children [8].

Those dying in the first three weeks usually showed severe pan-leukopenic manifestations. Where death occurred in the third to fifth week hæmorrhagic lesions predominated and were associated with low leukocyte and platelet levels and possibly a circulating anti-coagulant. At this stage, ulcers, hæmorrhages and necrotizing pneumonia were common. The oral and buccal ulcers were sometimes nomatous.

Deaths after six weeks were usually associated with a severe wasting condition.

Delayed Radiation.—The fission products which are created by the explosion of an atomic bomb continue to decay and give rise to radiation as they are carried up in the mushroom cloud. In a high air burst the effect of this radiation on personnel is negligible although the question of fall out at a distance has to be considered. Where, as a result of an underwater burst, a base surge has been produced the delayed radiation effect will be greatly enhanced. Personnel engulfed in the radioactive cloud, which in the Bikini trials moved over an area of five square miles [6], will be subjected to beta and gamma radiation from all directions and will in most cases receive a lethal dose of external radiation. Such personnel and their clothing will, like everything in the area, be contaminated by radioactive substances.

Radioactive contamination.—In an area which has become heavily contaminated there is a significant but not necessarily lethal external radiation hazard. This hazard is due to beta and gamma radiation; in the case of the former suitable clothing will protect the skin and superficial tissues from damage. A recent report in the J.A.M.A. [34] described some of the lesions produced at Eniwetok; chronic ulceration of the skin and sloughing of tendons resulted from “breakdown in protective measures.” Against the more penetrating gamma radiation no adequate shielding can be worn by those working in a contaminated area, and thus it is important that the level of radiation should be known in order to avoid excessive exposure. “Burns” due to radiation from an external source have been reported since shortly after the discovery of radium [26].

In connexion with radioactive contamination, internal radiation is a serious delayed hazard. The radioactive material may enter the body by inhalation or ingestion or through open wounds. It is mostly in particulate form and protection from inhalation may be obtained by wearing a suitable respirator. Working in a contaminated area is likely to stir up dust and increase the inhalation hazard.

As certain fission products and plutonium are predisposed to become localized in bone [11] where they remain fixed and decay over a long period, serious results, such as have already been observed in radium dial painters are to be expected [39]. Bone-marrow damage may result in aplastic anæmia and late effects may include pathological fractures, and sarcoma of bones. Displacement of bone-seeking substances has been tried [41]. The localization of a radioactive substance is utilized in the investigation [40] and treatment of thyroid disorders by I^{131} and in obtaining radio-autographs [27] or to study the circulation time, etc. [45]. Other radio-isotopes are used to produce more general internal radiation [38, 40].

Chronic effects of prolonged exposure to low levels of radiation have been studied for a long time in X-ray and radium workers [15]. These include ulceration and malignant changes in the skin, anæmia, severe or fatal aplastic anæmia and leukæmia. Chronic low level radiation in female mice has caused sterility.

Genetic effects of radiation have been studied in drosophila and neurospora: studies are proceeding on mice.¹ A survey of the Japanese survivors is being conducted in order to follow up any possible genetic effects—this will require years of patient work and careful vital statistics. Haldane [29] has stated that the total number of deaths from recessive mutations to be expected as the result of an atomic bomb explosion is a small fraction of the number immediately killed and is spread out over thousands of generations.

COLLECTION AND TREATMENT OF ATOMIC CASUALTIES

After an atomic explosion efficient rescues will be required if casualties who could be saved are not to perish in secondary fires. An adequate Defence Plan must be prepared in advance [33]. In rescue operations it will be important to conduct a survey for residual radioactivity and to take precautions against over-exposure [31]. For this suitably trained personnel will be required.

Priority in evacuation should be given to major surgical casualties. It should be remembered that those who have received more than 600 r total body radiation are unlikely to survive even where radiation effects are uncomplicated by burns and wounds [31].

It will be several days before symptoms of less severe radiation illness become apparent, the longer the latent period, the better will be the prognosis. In borderline cases the therapeutic challenge will be greatest. While it must be remembered that all forms of treatment tried up to the present have failed to prevent the ultimate death of animals given a fatal dose of total body irradiation, in some cases life has been prolonged. At slightly lower doses the possibility of death becomes a certainty unless adequate medical, surgical and nursing facilities are available.

Early surgical treatment is important, as the development of radiation illness

¹ Catcheside has recently reviewed these effects.

with lowered resistance to infection and an increased tendency to bleed will make surgical intervention at a later period more difficult. General measures should include complete physical and mental rest; mild sedation will probably be required. The diet should be low in residue and easily digestible. In the early stages there should be a low fat content with sufficient protein to meet basal requirements, carbohydrates should be sufficient for resting caloric requirements. In the later stages, as recovery begins, the diet should be rich in easily digested proteins and of high caloric value. Careful nursing will be required; the mouth, bowel and skin will require special attention. Bed-sores or infected wounds must be avoided at all costs and chilling prevented by careful control of ward temperatures. All hypodermic and intravenous techniques must be absolutely aseptic [20].

Other measures will probably require the use of penicillin and other antibiotics. Sulphonamides and other preparations likely to cause leukocyte depletion should be avoided. Controlled transfusions of whole blood and the use of plasma and substitutes will be required on a large scale. An adequate fluid intake must be maintained, intravenously if necessary. Specific anti-irradiation drugs may be available [1, 7, 22, 23, 24]—those tested up to the present time have been disappointing when given after irradiation in the lethal dose range.

Besides the two groups of those whose treatment can only be palliative and those who can and should be saved by adequate treatment of their burns, trauma and radiation there will be a third group who will need reassurance and can then be returned to useful work.

In evacuation plans air transport for radiation casualties is not contraindicated [46].

HYGIENE AND ATOMIC WARFARE

Besides the problems associated with large-scale destruction of buildings and interference with public services, which an atomic explosion would cause, the question of radioactive contamination is important. Personnel engaged in rescue operations must be protected by efficient monitoring and the spread of contamination prevented when an area is discovered. No authorized personnel should enter a contaminated area. Those who must do so should not be retained in the area long enough to receive more than "military tolerance" dose of radiation. When in a contaminated area, eating, drinking and smoking must be prohibited, the wearing of protective clothing and respirators will be ordered whenever necessary and personnel will be monitored on leaving the area to check for removal of contamination [6].

No food suspected of containing radioactive material should be consumed until it has been proved to be safe. Similarly suspected water supplies should be cut off and alternative safe sources used. Decontamination of radioactive water may be necessary [5].

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NUCLEAR PHYSICS DEFINITIONS

The Atom

Consists of:

- (i) *A nucleus* containing
 - (a) protons which have a positive electrical charge, and are equal in number to the atomic number of the particular element.
 - (b) a variable number of neutrons.
- (ii) *Electrons* which are negatively charged particles, equal in number to the protons in any neutral (uncharged) atom, and which circulate around the nucleus¹. Chemical properties depend on the number of electrons. The number of neutrons in the nucleus can be altered, thereby altering the atomic weight without affecting the chemical properties.

The Hydrogen Atom

The smallest atom consists of one proton (the nucleus) and one electron circulating round it. (Thus a proton is simply a hydrogen nucleus.) The nucleus is indicated by the symbol 1H^1

“Heavy Hydrogen”

Consists of hydrogen to the nuclei of whose atoms one neutron has been added. Its symbol is then, 1H^2 . In such a symbol the first number, or *subscript* is the *atomic number*, or *charge*, and equals the number of protons; the second number, or *superscript*, is called the *mass number* and equals the protons *plus* the neutrons. (Thus the radium nucleus is indicated by 88Ra , the charge, or number of protons, being 88, and the mass number, or protons plus neutrons, being 226, i.e. 88 protons + 138 neutrons.

A *deuteron* is a proton plus a neutron, and thus is simply a nucleus of heavy hydrogen.

Isotopes are atoms with the same charge but different mass number (owing to different number of neutrons).

Ionization consists of the removal of one or more electron from the outer shell, thus leaving a positively charged atom. This can be done by shooting high-speed electrons at the atom, the missiles knocking electrons out of their orbit.

X-rays.—By bombarding an atom with very high energy electrons, one of the electrons

¹ In “shells,” or concentric orbits, at different distances from the nucleus.

in a "K," or inner, shell may be knocked out and replaced by one of the outer shell electrons. In this process energy is liberated in the form of an X-ray.

Gamma-rays

The collision between a high energy atomic particle and an atom may "excite" the latter by absorbed energy from the collision and this energy may be got rid of by the emission of a gamma-ray, which differs from an X-ray only in being generally a higher energy "photon."

Alpha Particles, and Beta Particles

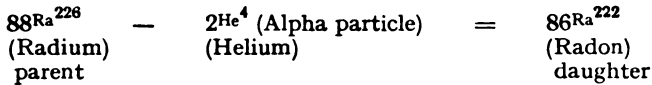
These are particles which, in addition to gamma rays, are given off by radio-active substances, such as radium and uranium.

Alpha particles are helium nuclei travelling at high speed. They are comparatively massive and therefore comparatively easily stopped.

Beta particles are electrons travelling at high speed and less easily stopped.

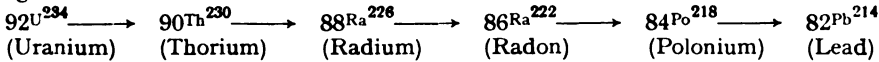
Radio-active Decay or Disintegration

e.g.

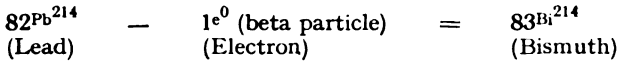


But radium and radon are only generations in a parent-daughter series, usually called a radio-active series.

e.g.



The heaviest "natural" lead, however, is ${}^{208}_{82}\text{Pb}$ so that ${}^{214}_{82}\text{Pb}$ has six more neutrons than any lead in nature. The further emission of alpha particles would increase this imbalance. It, therefore, emits a beta particle, and, since the emission of a beta particle is accompanied by the conversion of a neutron into a proton, we have:



and by further emission of alpha and beta particles becomes ${}^{206}_{82}\text{Pb}$, which is a stable lead isotope. Eventually all radio-active elements are reduced to lead.

"Half-life"

The half-life of a radio-active element is the time in which half of the atoms of any given quantity of that element will have decayed. Thus the half-life of radium is 1,690 years.

Measurement

Curie is a measurement of activity.

e.g. a millicurie of radium is the amount which gives off 37 million particles per second. 1 millicurie (mc.) = 1/1000th of a curie.

Roentgen is a measurement of dose.

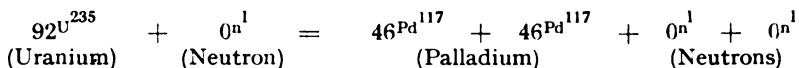
e.g. 1 r is the quantity of X-radiation which produces 1 electrostatic unit of ions when passing through 1 c.c. of air. 1 milliroentgen (mr.) = 1/1000th of a roentgen.

Measurement is made by means of Geiger counters, ionization chambers, photographic emulsions, etc.

Nuclear Fission

The electrostatic field round the nucleus bars entrance to electrically charged particles, but neutrons can be made to enter. Thus, if a deuteron (proton + neutron, i.e. a nucleus

of heavy hydrogen) is fired at great speed, e.g. by a cyclotron, the proton is diverted but the neutron may enter. This "excites" the nucleus and may lead to fission, e.g.



The palladium atoms so produced are known as "fission products." Usually the fission products, however, are not equal, and sometimes fission produces more than two products. The neutrons (two in the example above), are emitted at high speed. During the process gamma rays, beta particles, and sometimes alpha particles, may also be omitted.

The fission products are usually heavy isotopes. Thus the heaviest natural palladium is ${}^{46}\text{Pd}^{110}$ (cf. ${}^{46}\text{Pd}^{117}$, above). Hence beta particles are emitted at high speed, corresponding to the production of stable lead described previously.

Each fission produces more and more neutrons (see the uranium fission reaction described above), and these neutrons, emitted at high speed, are capable of entering further nuclei, thus setting up a *chain reaction*.

THE CONTROL OF CULICINE MOSQUITO BREEDING IN SEPTIC TANKS BY MEANS OF D.D.T. BRICKS

BY

Captain C. E. SHEARMAN

Royal Army Medical Corps

ALL septic tanks on W.D. land on Singapore Island breed culicine mosquitoes in enormous numbers if left untreated. The extent of breeding has to be seen to be believed and, as the tanks are usually in close proximity to billets and married quarters, the nuisance at night is very considerable. Furthermore many of the bites tend to become septic, particularly with women and children. Control is essential, both from the civilian and army standpoint.

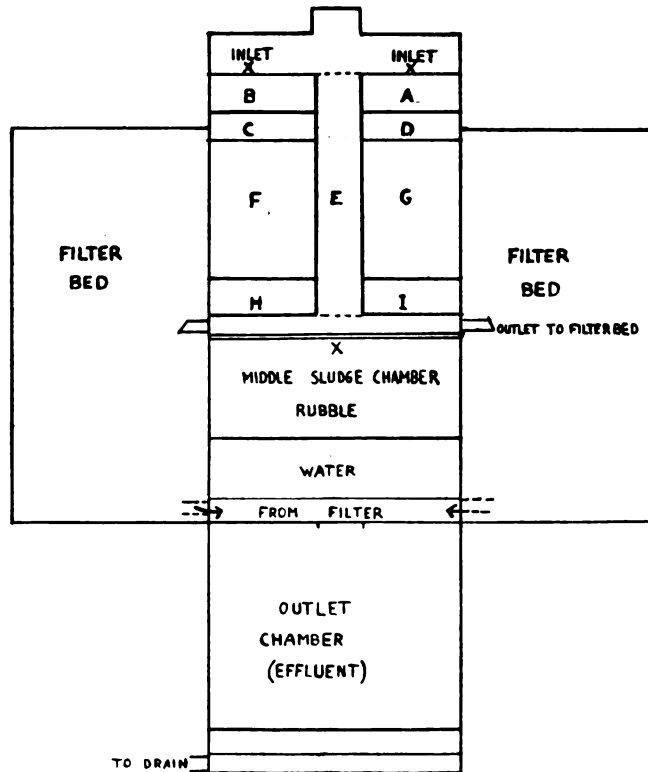
For eighteen months this was effected by normal weekly oiling with anti-malaria oil, but there are certain objections to this method, viz.:

- (a) Each chamber of the tank must be oiled. This entails removing all cover slabs and in practice, oilers, unless very closely supervised will not do this diligently.
- (b) The oil eventually reaches the filter bed and theoretically reduces the aeration capacity. Actually no deterioration was noticed during the eighteen months, but it is possible that the cumulative action of the oil over a longer period may lead to a sudden breakdown of the filter bed.
- (c) A possibility of destruction of the bacterial action which is so essential in a septic tank. This theory was propounded many times by the civilian health authorities, but during the whole period no detrimental effects were ever noticed in any septic tank under control. It is difficult to visualize that an oil film would prevent the action of anaerobes. On the contrary it should assist, and this objection was never seriously considered.

However, the first two objections remained very real, and in an endeavour to overcome these it was decided to try what measure of control could be obtained by means of D.D.T. bricks. The experiments were commenced in January 1949 and terminated in September 1949 and were conducted in various types of septic tank, although the main experiments with controls were made in an Ihmoff type tank constructed as shown in the diagram. Bricks were cast to a standard size of 4 in. x 4 in. x 3 in. and were made from both cement and plaster in the proportions of 1 part cement to 6 parts sawdust and 1 part plaster to 4 parts sawdust—by volume.

The bricks were thoroughly dried in the sun, a process which took forty-eight to seventy-two hours, and then soaked for twenty-four hours in a solution of 5 per cent technical D.D.T. powder in anti-malaria oil. The amount of oil

absorbed averaged 12 ounces by weight, with little variation, and no increase in absorption was obtained by soaking up to seventy-two hours.



X = Valves.

Measurements : Chambers A & B 3 ft. \times 3 ft.; C & D 3 ft. \times 1½ ft.; F & G 6 ft. \times 3 ft.; H & I 3 ft. \times 1 ft.; E 10 ft. \times 1½ ft.

EXPERIMENT I

Cement-sawdust bricks were *dropped* into chambers A.D.G.I. shown on the diagram. Chambers B.C.F.H. and E. were left as controls. Breeding was heavy, comprised all stages, and was approximately equal in all chambers.

After twenty-four hours : No noticeable decrease of breeding in any chamber.

After forty-eight hours : A slight decrease in the controlled chamber, none in the controls.

After seventy-two hours : Approximately 50 per cent decrease in the controlled chambers. Controls normal.

No further decrease was noted and by the eighth day breeding in the controlled chambers commenced to increase and had returned to its previous level at the fourteenth day.

The controls remained approximately constant throughout. Slight traces only of oil were noticed in the controlled chambers.

EXPERIMENT II

A plaster-sawdust brick was dropped into the outlet chamber shown on the diagram and further plaster-sawdust bricks, one to each controlled chamber, into a simple rectangular septic tank divided by baffles. In each case other chambers of the two tanks were used as controls. Culicine breeding was heavy throughout.

A moderate reduction of breeding was noted in all controlled chambers after twenty-four hours but, by the end of a week, larvæ were as numerous as ever. There was no noticeable reduction in the control chambers.

EXPERIMENT III

Further trials were conducted with cement-sawdust bricks in relatively clear open pools in which both culicine and anopheline larvæ were breeding. These were made to test the efficiency of a cement-sawdust as opposed to a plaster-sawdust brick, as it was known from experience in the Middle East that the latter gave excellent control under similar conditions. Again, an initial moderate decrease in breeding occurred, but was not maintained and the suspicion arose that possibly the D.D.T. was being hydrolysed by the alkali in the cement.

It was then decided to concentrate on the use of plaster-sawdust bricks. The failure of experiments I and II could be attributed only to the fact that the bricks had become covered with sediment at the bottom of the chambers, and the oil release inhibited. To understand the nature of experiments IV to VI a brief description of the working of the septic tank is given. There are two inlets, one of which works through chambers A—I and the other through chambers B—H. Each inlet with corresponding chambers can work independently of the other. Run-off to the filter beds is through E. Effluent from the filters passes along a small channel in front of, but not directly connected with the middle water chamber. The latter merely takes surplus liquid from the sludge when this is run-off periodically. From the small channel, liquid passes to the final effluent tank and thence to the drain.

On the basis of this, there should be a steady liquid movement from A to B to the final outlet, but excluding the middle water chamber. Chambers A to I and B to H are not completely divided, but separated only by baffles.

EXPERIMENT IV

One plaster-sawdust brick was suspended about 6 inches below the water level at the inlet end of the outlet chamber. All other chambers were left untreated as controls. Breeding was heavy and fairly equal throughout. At the end of twenty-four hours a noticeable reduction in breeding had occurred. By the end of forty-eight hours almost all larvæ were dead, but a number of pupæ remained. The latter were still present at the end of the third day, but full control had been effected by the fourth day. The pupæ had possibly developed into adults, but this obviously could not be verified. On the eighth

day larvæ and pupæ were seen in the chamber, and as the latter had been checked clear the previous day their existence could be accounted for only by being washed down from the main inlet chambers which were breeding heavily. On investigation larvæ and pupæ were actually seen in the channel from the filter bed outlet and moving to the inlet of the outlet chamber. Further investigation revealed large numbers of larvæ and pupæ flowing on to the filter tippers and from these to the filter bed. No doubt the mortality on the latter is heavy, but a reasonable number struggle through. During the whole course of the experiments this phenomenon was found to be very constant when breeding was allowed in the inlet chambers.

After twenty-four days from the placing of the brick, breeding in the chamber commenced to increase and could not be kept under control. This was attributed to a great deal of scum and old vegetation which had been washed into the chamber by heavy rains. (That the brick was still releasing D.D.T. was proved by removing it after five weeks to an uncontrolled chamber, when it gave immediate control.) A second plaster-sawdust brick was suspended in the outlet chamber after removing all surface debris, and this brick maintained full control for seven weeks, a period which coincided with lack of heavy rain. The outlet chamber was built in an excavation, some 10 feet below ground level and collected a considerable amount of run-off water from the surrounding slopes.

EXPERIMENT V

One plaster-sawdust brick was suspended 6 in. below the water surface in the middle chamber. As noted previously this particular water was static and completely isolated from the general flow in the tank. Breeding was very heavy, but full control was obtained within three days and maintained for twelve weeks, after which 3rd and 4th instar larvæ, and pupæ appeared and continued to increase. Numerous egg-rafts were present throughout the experiment, but from the third to the twenty-second day no larvæ or pupæ were found by dipping. After this time, hundreds of 1st and 2nd instar larvæ were noted, but for twelve weeks no later instars were ever found.

EXPERIMENT VI

One plaster-sawdust brick was suspended by wire in each of chambers A and B. The length of the wire was adjusted so that each brick just reached the bottom of the first baffle. After twenty-four hours there was an appreciable difference in the number of larvæ and pupæ in these two chambers, and after three days control was complete apart from the existence of odd pupæ. There was no decrease in breeding in the other chambers; if anything, a slight increase. By the twelfth day, control was still complete in chambers A and B (no pupæ had been seen since the fourth day) although numerous egg-rafts were seen at each daily inspection. There was no indication of control in any other chamber.

It appeared obvious, that despite the direction of liquid flow in the tank.

and the depth of the brick, the baffles were effectively preventing the penetration of D.D.T. oil film to other chambers. D.D.T. bricks were then suspended in all chambers. After twenty-four hours no larvæ were found in C.D.H.I., but a few pupæ still remained. E.F.G. showed a marked reduction in breeding, but it was four days before full control was established. So far, through sixteen days of experiment, numerous egg-rafts were always noted. It was common to count fifty in any one chamber, and this was by no means a full count.

Many dead adult mosquitoes were also seen. Whether due to contact with D.D.T. oil film when egg-laying, or on emergence from pupæ was not ascertained at the time.

Full control was maintained with one brick for each chamber for periods as shown below:

A —	Breeding commenced	6	weeks	after	placing	D.D.T.	brick	
B —	"	9½	"	"	"	"	"	"
C —	"	7½	"	"	"	"	"	"
D —	"	8½	"	"	"	"	"	"
E —	"	10	"	"	"	"	"	"
F —	"	6½	"	"	"	"	"	"
G —	"	5½	"	"	"	"	"	"
H —	"	6½	"	"	"	"	"	"
I —	"	6½	"	"	"	"	"	"

Breeding increased steadily from the times shown above, until three months after the experiment was commenced, larvæ and pupæ were as numerous as before control started.

EXPERIMENT VII

To further check the efficiency of cement-sawdust bricks, one was suspended in each of chambers B.D.G.H. and one plaster-sawdust brick was suspended in each of chambers A.C.F.I. Full control was obtained in forty-eight hours with the plaster bricks, but partial control only was obtained with the cement bricks, and after seven days breeding increased with the latter bricks and was maintained. After fourteen days all cement bricks were replaced by plaster ones as it was obvious that control was inefficient. All plaster bricks maintained full control until replaced after one month.

Similar experiments were conducted in a second identical septic tank. The duration of full control was inclined to be shorter than with the first tank, and varied from four and a half to six weeks.

No experiments were made on the middle chamber of the second tank as for some reason breeding was never found. However, an interesting discovery was made. At first, the outlet chamber only was controlled, as all the inlet chambers A to I were completely sealed off with concrete slabs and all joints cemented, and it was not thought that any breeding could possibly occur. The sudden appearance of larvæ and pupæ in the bottom chamber placed the inlet

chambers under suspicion and on breaking the joints and opening up, heavy breeding was seen, and again larvæ and pupæ were observed flowing on to the tippers and through the filter bed. The only ingress for the female mosquito was through the outlet pipe to the filter tippers, and furthermore, so far as could be ascertained breeding was occurring in absolute darkness, which is not generally considered possible.

In smaller type septic tanks there is very often an incomplete formation of surface scum, and culicine breeding has been found to be heavy in the small "islands" of liquid throughout the scum. The suspension of D.D.T. plaster bricks below the scum on the assumption that the released oil would float upwards to the "islands" of breeding has not been found successful. Several experiments were made in different septic tanks but control of isolated pockets of breeding enclosed by thick scum was a complete failure, using D.D.T. bricks. Normal oiling was found to be the only practicable method of elimination.

Theoretically, these "islands" of liquid should not exist, and with a normal working septic tank scum should form over the whole surface of the scum chamber. In practice, however, they have been proved to be a troublesome, if minor, source of breeding.

Several more experiments were made, involving every type of septic tank known, and the method of suspension of the D.D.T. brick in the chamber was used throughout. In all cases where breeding occurred in chambers with a liquid surface only, full control was obtained and maintained for never less than one month, and usually six weeks. No failure was recorded.

DISCUSSION

The control of culicine mosquito breeding in septic tanks by the use of plaster-sawdust bricks soaked in 5 per cent. D.D.T. in antimalaria oil has been tried in an effort to obtain full control by means of minimum oil, labour, and time.

With D.D.T. bricks a septic tank need be opened once a month only, and in some cases less frequently, as opposed to weekly opening when normal oiling methods are used.

The method is more certain in that the various chambers of a septic tank are less likely to be missed, and, if so, are easily traced on inspection by the absence of a brick.

The bricks do not easily disintegrate, and can be removed, washed, dried, and resoaked in oil.

Possibility of damage to the filter bed by large doses of oil is eliminated.

A system of control for septic tanks has been found necessary owing to the frequency of opening up for maintenance by R.E. personnel.

CONCLUSIONS

Mosquito breeding on moving and static liquid surfaces in a septic tank can be fully controlled by D.D.T. plaster-sawdust bricks.

A brick must be suspended and not dropped, in each chamber of the tank.

Full control by one brick will continue for at least one month on a moving liquid surface, and for three months on a static liquid surface, provided no scum is present.

Cement-sawdust bricks are useless, probably due to hydrolysis of the D.D.T.

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ARMY DERMATOLOGICAL RESEARCH UNIT

RESEARCH ON SKIN DISEASE IN F.A.R.E.L.F. 1947-8.

THE O.C., Dermatological Research Team, recently presented a report on two years' work by the Team on dermatological problems among Army personnel in the Far East. The following is a brief summary of the findings:

FUNGUS INFECTION

The most important dermatological problem among male British troops in S.E. Asia is fungus infection of the skin. Clinically this entity divides itself naturally into infection of the soles and toe clefts and infection of other areas. These conditions will be referred to as "foot ringworm" and "body ringworm" respectively. It must be constantly borne in mind that although these are clinically distinct, the same organisms can (and frequently do) give rise to both; it is therefore necessary, when dealing with epidemiology, to consider fungus infection as a whole.

A clinical consideration of body and foot ringworm follows.

Body Ringworm

Incidence.—Of some 1,700 B.O.R.s examined at skin inspections, 33.5 per cent were found to have ringworm of the body. From this overall figure, indicating infection at any given moment of 1 man in every 3, only small deviations were found among different units among troops in different localities, and among troops with different occupations (e.g. R.E.M.E. as compared with Infantry). Men were inspected in Singapore, at various stations on the western side of the Malayan peninsula, and in Hong Kong during the hot season, and in all these places an infection rate of roughly 1 in 3 was found.

Ætiology.—Body lesions from a total of 88 individuals were cultured and yielded the following pathogenic fungi (figures represent percentage incidence of each species):

Species	Abbreviation	% incidence
<i>Trichophyton mentagrophytes</i> var. <i>asteroides</i>	TMA	54
<i>Epidermophyton floccosum</i>	EF	33.7
<i>Trichophyton rubrum</i>	TR	8.2
<i>Trichophyton interdigitale</i>	TI	2
<i>Trichophyton violaceum</i>	TV	1
<i>Microsporon gypsum</i>	MG	1

It can be seen that over one-half of all infections were due to TMA and about one-third to EF, other fungi play a relatively unimportant part. It should be noted that several individuals were infected, either successively or simultaneously, with more than one fungus.

Clinical Description.—The lesions produced by these organisms conformed in general to the classical description of *tinea circinata*; the majority were annular or discoid, with scaling, erythema and minute vesicles at the edge and a tendency to heal in the centre. The anatomical distribution in 497 cases was as follows:

	No. of cases	% of total
Face	20	4
Shoulders	18	3.6
Axillæ	24	4.8
Arms	16	3.2
Hands	5	1
Trunk	49	9.9
Belt area	87	17.5
Crutch	347	70
Buttocks	99	20
Legs	68	13.7
Feet (dorsum)	40	8

Thus in nearly three-quarters of all cases the crutch was involved, buttocks and belt area come next in order of frequency but lag far behind. In 165 cases, or 33.2 per cent of the total, the crutch was the only site involved. Many cases were seen, however, of florid, widespread infection.

With regard to clinico-pathological correlation, 3 points should be noted:

All pustular, indurated lesions were due to *TMA*.

In temperate climates *EF* lesions are restricted to crutch and axillæ. In the present series, however, many cases were seen of generalized infection with *EF*, involving such areas as waist, legs and dorsum of foot as well as crutch and axillæ, and indistinguishable in this respect from an infection with *TMA*.

With the exception of pustular lesions, no certain criterion was found for the clinical diagnosis of infection with a specific organism. Two tendencies, however, were observed. *EF* usually produced confluent lesions and *TMA* separate plaques, especially in the crutch; and observations on untreated lesions indicated that while *TMA* infections showed a tendency towards spontaneous healing within, at the most, ten weeks, *EF* infections might persist longer than this (in one instance up to ninety days).

Deep Tinea

The pustular, indurated lesions mentioned above as peculiar to *TMA* infections constitute a special dermatological problem. They occur in areas where hairs are well developed, especially the scalp (*Kerion*), the face (deep tinea barbae) and the limbs (agminate folliculitis). The pubis may also be involved. The lesions appear as boggy, indurated, reddened areas, discharging thick yellow pus; they are usually painful and always resistant to antifungal remedies.

In the past it has been suggested that such lesions arise by secondary coccal infection of an existing patch of tinea. However, bacteriological examination of the pus in 36 lesions showed that pathogenic staphylococci were present in only 20, and hæmolytic streptococci in none. Moreover, in 14 lesions culture of the pus yielded *TMA* only (blood agar plates kept three days at room temperature, i.e. about 27° C.). In 14 lesions no *TMA* was found but it must be remembered that the recovery of bacteria was probably more efficient than that of fungi. It seems likely that pus can be produced by the fungus alone, without the assistance of staphylococci, and that it is a natural response by the body's defences to extension of a superficial fungus infection down the hair shafts.

Treatment.—It must be emphasized at the outset that tropical body ringworm is much more difficult to treat than the ringworm seen in temperate climates, and many remedies which would prove effective in U.K. are useless in the tropics.

Certain general principles are of fundamental importance:

Early treatment is essential: The men should be encouraged to report suspected tinea lesions early, but this cannot be relied upon and regular skin inspections are necessary to enable fresh cases to be detected. As a case can become generalized within a week, it is clear that inspection at intervals of more than a week is useless.

Treatment must be regular, applied three times every day, and prescribed only by the M.O. Continual vigilance is necessary to prevent slackness in attendance, self-treatment or treatment by the M.I. room orderlies.

Light duty is advisable for all but the mildest cases, and generalized cases require treatment in bed. Sedation may be necessary if itching is severe.

Cases should be seen by the M.O. at least every three days, and preferably every other day; this is to allow the detection of new lesions as soon as possible after they appear. For the same reason each man must strip completely when presenting himself for inspection as the whole of his skin should be examined at each attendance.

As regards antifungal therapy, numerous drugs were tested, but only the following are recommended:

Chrysarobin 4 per cent in Lassar's paste: This is the preparation of choice. Reactions are few and irritation very uncommon, and the therapeutic potency is very high. Occasionally resistant lesions will not respond to the 4 per cent paste and 6 per cent chrysarobin can then be used, but the risk of reactions then becomes appreciable. Painless erythema at the site of application, not accompanied by itching, is not regarded as a "reaction" as the word is used here and is not an indication for stopping chrysarobin.

This preparation has three disadvantages:

If it enters the conjunctival sac it will cause a severe conjunctivitis. Care is therefore required in treating lesions of the face.

It rendered the skin at the site of application abnormally photosensitive, so that a solar burn may be produced by a degree of exposure which would ordinarily be inadequate. This can easily be avoided by a few words of warning to the patient.

Chrysarobin is a crude drug. Its activity depends on its content of certain active substances, and this may vary slightly from batch to batch.

Phenyl mercuric acetate or chloride, 0.5 per cent in Eucerin or Lassar's paste: This is a most potent preparation but very prone to cause severe irritation and blistering at the site of application. It should only be used by an experienced dermatologist and is not suitable for use in M.I. rooms. If the mercurial is cut down to 0.2 per cent reactions diminish but so does the therapeutic power.

6 per cent salicylic acid and 12 per cent benzoic acid in a starch-paraffin paste: This is of high potency but very apt to cause irritation and burning, especially in the crutch, and this limits its use as a routine preparation.

Vehicles

Paraffin-starch pastes seem to be the most effective vehicles; they remain on the skin for long periods of time and are not easily washed away by sweat as are the newer water miscible bases such as eucerin. Paints, using such bases as alcohol, tinct. benzoin co., and chloroform, were found to be much less satisfactory.

The chosen preparation should be applied three times a day. Alternatively it can be applied in the form of a dressing, being smeared on a piece of lint and the latter secured in position over the lesion by adhesive plaster. Such dressings can be left continuously in position for up to ninety-six hours. This method is valuable for isolated lesions but becomes very time-consuming if the ringworm is widespread.

The total duration of treatment required, excluding cases of generalized or deep tinea, is usually between seven and ten days. It is advisable to continue for at least two days after the lesions appear healed. Treatment lasting less than seven days is likely to be followed by relapse.

No antifungal remedy is of any value in the treatment of deep tinea. The most

valuable agent appears to be local heat. Healing takes place, with scarring and loss of hair from the affected follicles, in five to eight weeks.

Foot Ringworm

Incidence.—This proved less easy to assess than the incidence of body ringworm, because of the uncertainty of clinical diagnosis. Eighty to ninety per cent of male B.O.R.s had interdigital lesions resembling those caused by fungus infection, but not all these could be shown to be of fungal origin. The problem was investigated as follows. A series of 35 men chosen at random was classified according to the state of their interdigital clefts and then cultured; the percentage of positive cultures for each class was worked out. The result is summarized in the table below.

<i>Clinical</i>					<i>No. cases</i>	<i>% + culture</i>
Grade I	No lesion detectable	...	...	...	0	0
Grade II	Any one or two of the following: maceration, peeling, redness, fissures	...	...	...	9	22.2
Grade III	Maceration, redness and peeling all present				2	50
Grade IV	Vesicles, broken vesicles or ring formation of the elements described above	...	...	...	24	79

The probability of obtaining a positive culture can therefore be correlated with the clinical appearances. From experience with a larger series of men it is believed that the distribution of grades in the series above is not representative of that in the general population, and the true incidence of Grade IV lesions is probably about 50 per cent. It may be presumed that between 50 and 60 per cent of the population studied have foot lesions yielding pathogenic fungi on culture.

Ætiology.—Using the same abbreviations as in the case of body ringworm, the species distribution of infections was as follows:

<i>Fungus</i>	<i>%</i>
<i>TMA</i>	40
<i>EF</i>	43.7
<i>TR</i>	3.8
<i>TI</i>	12.5

It will be seen that *EF* and *TI* play a more important part in foot than in body infections.

Clinical Description.—The infection principally involved the toeclefts, especially the 3rd and 4th clefts on each side. The signs of infection have been mentioned above. In many cases the lesion extends from the clefts on to the dorsum of the foot or the flexures of the toes or both. Deep, itching vesicles on the sole of the foot are found in a few cases and such lesions invariably yield cultures of pathogenic fungi without difficulty.

Treatment.—Since ringworm of the feet is rarely incapacitating and is notoriously difficult to cure completely, suppression of the infection seems the ideal at which to aim. Relatively little attention was paid, therefore, to the problem of curative treatment.

- (1) 2–4 per cent chrysarobin in Lassar's paste.
- (2) Salicylic acid 2 per cent, benzoic acid 4 per cent in spirit.
- (3) A proprietary foot powder containing 5 per cent methyl-p-hydroxy-benzoate and 5 per cent salicylic acid in talc.

The last was definitely less effective than (1) and (2). Treatment with a foot powder containing 5 per cent methyl-p-hydroxy-benzoate and 5 per cent salicylic acid in talc was unsatisfactory.

The Epidemiology of Fungus Infection.

It has been held for many years on purely clinical grounds that body ringworm is usually acquired by extension of infection from the patient's own feet. The present

investigation supports this theory. In the first place, foot infection (50–60 per cent) is commoner than body infection (33 per cent) and in the second place, of 43 cases in which fungi were cultured from both feet and body, 86 per cent yielded the same fungus from both sites.

On the other hand, a number of cases were seen with florid body ringworm but clinically normal feet. There must be, therefore, some source of infection besides the patient's own feet.

But from the favourable results of prophylactic trials aimed at reducing foot-to-body spread it may be inferred that this mode of spread is of great importance. Probably the endemic fungus infection is maintained by being spread from one man's feet to the next man's, with frequent extension from a man's feet to his body. Existing conditions favour such a spread, it could easily take place if an uninfected man were to receive back from the dhoby not his own socks but those of an infected man. This must occur frequently as socks and stockings are seldom or never marked. Other possible channels of foot-to-foot infection are the use of communal football boots and the practice of walking barefooted in barrack-rooms and shower-rooms. Owing to the technical difficulty of obtaining cultures of ringworm fungi in the presence of very large numbers of contaminant fungi it has not been possible to furnish mycological proof of the existence of these channels of infection; but the opinion of other workers in the same field strongly favours the possibilities mentioned above.

Body-to-body infection, which appears commoner in units with high rates of body ringworm, probably occurs via borrowed towels and clothes, especially communal sports gear, and is thought to be favoured by dissemination of fungi among the men's clothes during laundering. As the fungi concerned are very sensitive to heat, it is obviously important to ensure that all non-woollen articles are boiled during laundering.

The source of the widespread fungus infection of feet described above is of great interest, particularly if preventive measures are being planned. Evidence bearing on this problem has been obtained by comparing the species distribution of fungi cultured from the feet of recruits in U.K. with the distribution observed among soldiers in the Far East. The comparative figures are as follows:

					U.K.		Far East
No. of infections	...	...	...	...	39	...	80
<i>TMA</i>	%	...	...	...	0	...	40
<i>EF</i>	%	...	...	...	15.4	...	43.7
<i>TI</i>	%	...	...	...	74.5	...	12.5
<i>TR</i>	%	...	...	...	10.3	...	3.8

(The U.K. figures are the result of work by Major Slattery, R.A.M.C.)

From these results it is clear that, if the possibility of the conversion of *TI* to the closely related species *TMA* on entering a hot climate is excluded, most of the foot infections must have been acquired in the Far East. *TMA* infections are uncommon in U.K., either on foot or on body, except in persons in close contact with animals, which constitute the main reservoir of this infection in temperate climates.

The population studied in the Far East did not have sufficient contact with animals to make the latter a likely source of *TMA*. Nor were the local inhabitants considered a probable source, since the predominant fungus infection among them was *TR*. It was concluded that newcomers to the Far East probably acquired *TMA* from their previously infected fellows, and that the original source might have been animals, or possibly an endemic infection of humans in another tropical theatre such as India.

Prophylaxis of Body Ringworm.

Early prophylactic trials aimed at preventing spread from man to man by segregation of affected men in separate units. This proved to be an ineffective measure. The effect of frequent skin inspections, with the object of detecting cases as early as possible, was

then tried, but any beneficial effect on the ringworm rate in this trial was marked by the inadequacy of the treatment then in use. Finally, it was shown that in a unit with an initial body ringworm rate of 23 per cent, frequent skin inspections and effective treatment could reduce the rate to 15–18 per cent, while a further reduction was obtained by issuing to half the men a foot paint of the following composition:

Salicylic acid	—	2%	} in spirit
Benzoic acid	—	4%	
Brilliant green	—	0.1%	

This test group were told to apply the paint twice daily, irrespective of the state of their feet. The brilliant green served simply as a "marker" to show whether the paint was being used. In ten weeks the body ringworm rate in the foot-paint group fell to 4–6 per cent, while in the control group it fell to a much lesser degree, to 10–12 per cent. During these ten weeks new cases occurred in the foot-paint group corresponding in number to 5.5 per cent of its strength: in the control group the figure was 14.5 per cent.

This foot-paint therefore appears to be of some promise as a prophylactic agent, at any rate where close supervision is possible. It should be noted, however, that a trial of its use by troops under campaign conditions was much less encouraging.

Other prophylactic measures, such as boiling of clothes during laundering, have been mentioned above.

Prophylaxis of Foot Ringworm.

The experiment quoted above aimed at prevention of body ringworm by suppression of foot ringworm. Complete eradication of foot infection is probably impossible, but attention should be paid to the following points in its suppression:

Socks and stockings should preferably be washed by their owners as the risk of confusion in a laundry is very great. In any case, and especially if socks are sent to a laundry, disinfection (after washing) by exposure to the vapour of 40 per cent formalin for twenty-four hours is advisable.

All communal sports footwear, e.g. football boots, should be disinfected in this way after use.

BULLOUS IMPETIGO

Incidence.—This varies between 6 and 8 per cent among B.O.R.s. It is almost unknown in Asiatics and very rare among A.T.S. It is a disease of warm climates: it occurs during the summer in Hong Kong but disappears during the winter.

Clinical Description.—The distribution of the lesions in 95 cases was as follows:

Site	% of cases having lesions in this site		
Axillæ	83.2%
Waist	12.6%
Crutch	6.3%
Other sites	16.8%

The initial lesion is a small papule which rapidly develops into a thin-walled bulla containing thin pus. The bullæ vary between 0.3 and 1.5 cm. in diameter. They soon rupture, and a crust forms at the site and is shed in about four days. Each lesion thus lasts, if treated, for about five days, but each untreated case lasts for about 12 to 18 days.

Ætiology.—95 intact bullæ, occurring in 65 cases, were examined. All contained large numbers of coagulase-positive staphylococci. In addition two atypical bullæ also yielded hæmolytic streptococci. 25 bullæ were examined by anaerobic culture but none yielded any anaerobic streptococci. Hæmolytic streptococci were commonly found in ruptured

bullæ, together with staphylococci; they are thought to be secondary invaders only. The causative organism of the disease appears to be a coagulase-positive staphylococcus.

Skin infection with staphylococci in U.K. is very commonly associated with the presence of staphylococci of the same type in the anterior nares. This is not the case among white troops in the Far East; pathogenic staphylococci were no commoner in the noses of cases of bullous impetigo than in the noses of the rest of the population. In 35 per cent of 54 cases of bullous impetigo, the nose contained staphylococci of the same type as those in the lesions; in the remaining 65 per cent the nose yielded either no staphylococci or staphylococci of a different type from those in the lesions, and in these some other source of infection must be sought.

From investigation of histories of contact, and of distribution of cases among men living in barrack-rooms, it is thought that the most important mode of spread is infection from case to case, rather than the production of many cases by infection from one nasal carrier.

Treatment.—The most effective treatment was penicillin cream, 500 units grm., three times a day for five days. Shorter courses than this led to high relapse rates. It is essential that the tops of bullæ should be removed as soon as they occur.

No satisfactory substitute for penicillin was found. Gentian violet, 2 per cent in water twice a day for five days, gave comparable results but appeared less reliable and caused troublesome staining of clothing. "Eau d'Alibour" which was claimed by some M.O.s to be of value was found to give results indistinguishable from those obtained by withholding all treatment. Cetyl-trimethyl-ammonium-bromide (CTAB) in 1 per cent solution occasionally gave good results but in most cases was of little value.

NON-BULLOUS IMPETIGO

This is much less common than the bullous variety and was found in 1.9 per cent of men inspected. The lesions were on the face in all cases and were typical of the ordinary crusted "impetigo contagiosa" seen in temperate climates. Cultures in 10 cases gave the following results:

<i>Staphylococcus aureus</i> only	...	...	...	3 cases
<i>Streptococcus pyogenes</i> only	...	...	...	2 cases
Mixed <i>Staph. aureus</i> and <i>Str. pyogenes</i>	...	...	...	5 cases

PRICKLY HEAT

This disease was only seldom encountered in a severe form; if the mildest, even symptomless, cases are included it is found in 28 per cent of B.O.R.s. It is uncommon among A.T.S. and among Asiatics it is a rarity, though it does occur.

It has been shown by other workers that the essential lesion is an obstruction of sweat ducts by keratin plugs. No difficulty was experienced in confirming the well-established observation that sweating is diminished in an affected area of skin.

It seems likely that the actual sensation of "prickling" is the result of secretion by obstructed glands. At one time it seemed possible that flushing of the skin could be the cause, but experimental hyperæmia, either induced by inhalation of amyl nitrite, or reactive following arterial occlusion, did not cause prickling.

Three cases of "tropical anhidrosis" were seen, two of whom had recently had severe prickly heat. Anhidrosis appeared to be complete, save on the face; however, experiments with the lanoline test described by O'Brien suggested that sweating was occurring at a greatly reduced rate, the moisture normally evaporating as soon as it reached the skin but accumulating when evaporation was prevented, by application either of grease or of a watch-glass to the skin. Lanoline appeared to be of little therapeutic value in this condition.

Notices

THE CHADWICK PRIZE AND GOLD MEDAL

PRESENTATION TO BRIGADIER A. E. RICHMOND, *C.B.E.*

LATE R.A.M.C. (RTD.)

AN honorific event which occurs only once in fifteen years is worthy of note. It is a pleasure to record it when the person concerned is well known and remembered for his services in the Corps.

On Tuesday, March 14, the Vice Chairman of the Chadwick Trustees (E. M. Rich, Esq., *C.B.E.*) presented the Chadwick Prize (£100) and Medal to Arthur Richmond who thus follows Sir William Horrocks, Sir Wilfred Beveridge and Sir William MacArthur in receiving these awards.

The Chadwick Trust was established by the Will and Codicil of the late Sir Edwin Chadwick, *K.C.B.*, on February 22, 1895, and exists for the promotion of Sanitary Science in its widest sense. "It is also open to the Trustees to present a sum of £100 and a Gold Medal as a Chadwick Prize to that Medical Officer of the Navy and Army (and Air Force) respectively who, in the opinion of the medical head of the Department, had in the preceding five years most distinguished himself in promoting the health of the men."

In introducing Brigadier Richmond to the Vice Chairman of the Trustees, Major-General T. Young, Director of Army Health, deputizing for the D.G. A.M.S., who was on tour in M.E.L.F. said:

"I wish to nominate Brigadier A. E. Richmond, *C.B.E.*, for the award of the Chadwick Prize and Medal. This officer was in Cairo as Deputy Director of Hygiene, Middle East, for four years up to November 1945. From November 1945 to November 1949 he was Director of Hygiene (later Director of Army Health) at the War Office.

In the Middle East he was responsible for the organization and development of the Army Health Service during the build-up of the large forces in that theatre and it was largely due to his wide experience and technical knowledge and to his inspiring leadership of his team of hygiene specialists that the troops enjoyed such good health and such remarkable freedom from preventable disease. Supplies at home and transportation overseas were very difficult and many factories sprang up in Egypt which supplied clothing, equipment, ammunition, food, etc., not only for the forces in Egypt but also for troops in other theatres of war, e.g. B.N.A.F. (later C.M.F.). A very successful industrial hygiene organization was developed to deal with the various industrial hazards to health which arose or which were likely to occur.

Brigadier Richmond's term of the appointment of Director of Hygiene in the War Office has been outstanding and has been marked by certain notable innovations, e.g.

(a) The introduction to the Army of the conception of "*Positive Health*" as opposed to the mere absence of disease—in other words the shifting of the emphasis from disease prevention towards the more dynamic aspect of true health.

(b) The replacement of the wartime methods of medical categorization by the *Pulheems System* which lays stress on functional capacity for work rather than on the effect of anatomical abnormalities in restricting a man's ability to work. In this way it is generally agreed that a more correct allocation to suitable employment is possible and that there will be fewer square pegs in round holes in the Services in future, and

(c) The stress laid on *personnel research* and on other research matters having a bearing on the physical and mental health, efficiency and comfort of the soldier in the differing environmental conditions which may be encountered during his service.

These innovations introduced and sponsored by Brigadier Richmond constitute outstanding contributions to the health and wellbeing of Army personnel."

In presenting the awards, Mr. Rich referred to the objects of the Trust and in particular to the granting of the Prize and Medal. He expressed, on behalf of himself and the Trustees, their great pleasure in accepting the nomination of Brigadier Richmond. He hoped that the prize would bring happiness and that the medal, though debased in content by statutory regulations, would be none the less acceptable as recognition of very valuable services in the promotion of health.

"Q.A. DAY," MARCH 27

A SERVICE in commemoration of Queen Alexandra becoming President of Army Nurses and the formation of Queen Alexandra's Imperial Military Nursing Services, was held in the chapel of the Queen Alexandra Military Hospital, Millbank, on March 27, 1950.

The service which was impressively sincere and simple, was conducted by the Rev. G. A. B. Lee, C.F., assisted by the Rev. A. Marshall, C.F., while the lesson was read by the Rev. S. Naylor, C.F.

The Band of His Majesty's 2nd Welsh Guards were present in full ceremonial dress.

It was greatly regretted that the Matron-in-Chief and Director of Army Nursing Services—Brigadier Ann Thomson, *C.B.E.*, *R.R.C.*, *K.H.N.S.*, was unable to be present. She had a previous engagement at the Q.A.R.A.N.C. Base Depot. She was represented by Lieut.-Colonel F. M. Smith, *A.R.R.C.*, from the War Office.

Dame Louisa Wilkinson, *D.B.E.*, *R.R.C.*, Colonel in Chief of the Q.A.R.A.N.C., and Dame Katherine Jones, *D.B.E.*, *R.R.C.*, were both present.

Lieut.-Colonel K. MacNeil, *O.B.E.*, represented Colonel W. A. D. Drummond, *O.B.E.*, *F.R.C.S.*, Commanding Q.A.M.H., who was absent on leave.

Also present were Colonel B. J. Daunt, *O.B.E.*, *A.D.M.S.*, London District, and Lieut.-Colonel E. E. Watkin, *R.R.C.*, *A.D.A.N.S.*, Eastern Command.

Nursing officers in their new grey and scarlet uniform acted as ushers to the congregation among whom were many old friends, retired members of Q.A.I.M.N.S.

After the service Lieut.-Colonel J. A. Dunn, and the Nursing Officers were At Home in the Q.A.R.A.N.C. Headquarter Mess—a very pleasant function where many old friendships were renewed.

Obituary

Colonel G. T. K. MAURICE, C.M.G., C.B.E., J.P.

COLONEL MAURICE, who was born in Marlborough on March 23, 1867, died in that city on March 8, 1950. He was educated at Marlborough College, was appointed Surgeon Lieutenant on July 29, 1895, and finally retired as Colonel on December 26, 1921.

He served in France and Belgium in 1914 and 1915 and in Macedonia and Palestine in 1917 and 1918. Three times mentioned in despatches he was created *C.M.G.*, received the Brevet of Colonel and the 1914 Star, British War and Victory Medals.

He again saw service in the third Afghan War, 1919, being mentioned in despatches, created *C.B.E.* and receiving the Medal with Clasp.

He was the author of "Birth Control and Population" and "Observations and Reflections on Wild Creatures."

His brother, Lieut.-Colonel G. K. Maurice, *D.S.O.*, *M.C.*, *R.A.M.C.* (retired), died in Marlborough on June 1, 1949.

Air Vice-Marshal F. C. COWTAN, C.B., C.B.E.

AIR VICE-MARSHAL COWTAN died in Farnham, Surrey, on March 5, 1950. After qualifying from St. Thomas's Hospital he became a Regular Officer in the Royal Army Medical Corps in July 1912. He became a Brevet-Major in June 1918 and resigned in September 1919 to become a Squadron Leader in the Medical Branch of the Royal Air Force. He became Air Vice-Marshal in June 1943 and retired (invalided) in December 1945.

While in the *R.A.M.C.* he served in France and Mesopotamia. He was four times mentioned in despatches, received the Brevet of Major, the 1914 Star, the British War and Victory Medals.

During the recent war he was Principal Medical Officer of Coastal Command, Fighter Command, Allied Expeditionary Force, and Bomber Command. He was twice mentioned in despatches and created *C.B.* and *C.B.E.*

Lieut.-General Sir Matthew Fell, *K.C.B.*, *C.M.G.*, *D.L.*, whose *D.A.D.M.S.* he was in Mesopotamia, writes:

I cannot allow the death of Frank Cowtan to pass without a word of tribute to him though I had not seen him for many years.

It was in Basra, in the summer of 1916, that I first saw him when he came to replace my *D.A.D.M.S.* who was sick.

I knew nothing of him personally, but in a very few days found that I had struck

a winner. Medical Administrative Affairs up and down the Tigris were in a rather hectic state that year but Cowtan settled down at once. He was not afraid of hard work and his natural gift for administration and orderly mind were of immense help to me.

From the first, I found him a delightful companion, and chuckled when he sometimes firmly but politely drew my attention to what he called "your irregular methods, Sir."

He stayed with me a loyal and devoted friend, until I left Mesopotamia in 1918.

Later when he came and told me that he would like to transfer from the R.A.M.C. to the new Medical Service of the Royal Air Force I was glad to do what I could to help him, for I knew what he was worth to the new service in its infancy.

JOURNALS RECEIVED

THE following journals have been received and are available in the Library of the R.A.M.College.

Practitioner, Military Surgeon, Medical Press, Bull. of Hygiene, Medical Journal of Australia, Royal Engineers Journal, Lancet, B.M.J., South African Medical Journal, Indian Journal of Medical Research, Jour. of the Royal Sanitary Institute, Glasgow Medical Jour., Bull. of the John Hopkins Hospital, Indian Journal of Malariology, Post Grad. Medical Jour., Journal of the Royal Inst. of Public Health and Hygiene, Vierteljahrsschrift fur Schweizensche Sanitatsoffiere, St. Barts. Hospital Jour., Wish Stream, British Medical Bulletin, Chronicle of World Health Organisation, Revista de Medicina Militar, Belgisch Tydschrift voor Militaire Geneeskunde, Proc. of the Royal Soc. of Medicine, Jour. of the R.A.S.C., Bull. International des Services de Sante, Tropical Diseases Bull., Edinburgh Medical Journal, Jour. of R.A.V.C., Clinical Proceedings, British Jour. of Dermatology and Syph., Indian Medical Gazette, Jour. of the Royal Egyptian Medical Assn., East African Jour., Revue du Corps de Sante Militaire, Archivos del Hospital Universidad, Quarterly Jour. of Medicine, Military Review.

Extracts from the "London Gazette"

HONOURS AND AWARDS

R.A.M.C. and late R.A.M.C.

War Office, 10th March, 1950

The King has been pleased to grant unrestricted permission for the wearing of the following decorations which have been conferred on the undermentioned personnel in recognition of distinguished service in the cause of the Allies:

Decorations conferred by His Royal Highness The Prince Regent of Belgium.

Chevalier de l'Ordre Royal du Lion avec palme et Croix de Guerre avec palme

Major (Q.M.) George Fearnley Beare, Royal Army Medical Corps.

Commandeur de l'Ordre de la Couronne

Lieut.-General Sir Alexander Hood, *G.B.E., K.C.B., M.D., F.R.C.S., F.R.C.P., LL.D.*, late Royal Army Medical Corps.

Commandeur de l'Ordre de Leopold II

Brig. John Mandeville Macfie, *C.B.E., M.C., M.B.*, late Royal Army Medical Corps.

Croix Militaire 1ere Classe

Lt.-Col. (Q.M.) Charles Edward Bull, *O.B.E.*, *D.C.M.*, *R.A.M.C.*

Decoration conferred by His Majesty The King of The Hellenes.

Gold Cross of the Order of King George I

Col. (temp.) Philip Francis Palmer, *O.B.E.*, *M.B.*, *R.A.M.C.*

War Office, 31st March, 1950

The King has been graciously pleased to confer the award of "4 clasps" to the Territorial Efficiency Decoration upon the following officer:

Maj.-Gen. Sir Ernest M. Cowell, *K.B.E.*, *C.B.*, *D.S.O.*, *T.D.*, *M.D.*, *F.R.C.S.*, *DL* (Hon. Col. *R.A.M.C.*).

The King has been graciously pleased to confer the award of "3 clasps" to the Territorial Efficiency Decoration upon the following officers:

Brig. F. R. Sandford, *C.B.E.*, *M.C.*, *T.D.*, *M.B.* (Hon. Col. *R.A.M.C.*).

Col. A. T. B. Dickson, *O.B.E.*, *T.D.*

Col. J. E. Rusby, *M.C.*, *T.D.*

The King has been graciously pleased to confer the award of "2 clasps" to the Territorial Efficiency Decoration upon the following officers:

Lt.-Col. J. W. Galloway, *T.D.*

Maj. (A/Lt.-Col.) F. R. Langmaid, *O.B.E.*, *T.D.*

Maj. R. S. Taylor, *O.B.E.*, *T.D.*

The King has been graciously pleased to confer the award of "1st clasp" to the Territorial Efficiency Decoration upon the following officer:

Col. H. F. Apthorpe-Webb, *T.D.*

The King has been graciously pleased to confer the award of the "Territorial Efficiency Decoration and 1st Clasp" upon the following officers:

Lt.-Col. J. D. Finlayson (71559).

Lt.-Col. T. N. Rudd.

Maj. E. C. Murphy.

The King has been graciously pleased to confer the award of the "Territorial Efficiency Decoration" upon the following officers:

(1) Royal Army Medical Corps.

Lt.-Col. S. W. Barber, *M.B.E.*, *M.B.*

(2) R.A.D.C.

Major L. G. Hitching.

PROMOTIONS**(1) R.A.M.C. and late R.A.M.C.****(a) To be Maj.-Gen.:**

Brig. (temp. Maj.-Gen.) J. M. Macfie, *C.B.E.*, *M.C.*, *M.B.* 28.3.50

Brig. J. Bennet, *M.D.*, *F.R.C.P.*, *K.H.P.* 28.3.50

(b) To be Brigadier:

Col. F. K. Escritt, *O.B.E.* 28.3.50

(2) R.A.D.C.**(a) To be Lt.-Col.:**

Maj. N. T. McNie 1.1.50

APPOINTMENTS

(1) R.A.M.C.

- (a) From Short Serv. Commn. is appointed to a permanent commn. in the rank of Captain, retaining his present seniority:
 Capt. G. M. McEwan 10.2.50
- (b) From National Service List to be Lt. (Short Serv. Commn.), retaining his present seniority:
 Lt. Martin Philip Cardew 31.2.50

SPECIAL APPOINTMENTS

- (a) Lt.-Gen. Sir Neil Cantlie, *K.B.E., C.B., M.B., F.R.C.S.*, late R.A.M.C., is appointed Honorary Surgeon to The King 13th Jan., 1950, vice Brig. Arthur Eaton Richmond, *C.B.E.*, retired.
- (b) Maj.-Gen. Thomas Menzies, *O.B.E., M.B.*, late R.A.M.C., is appointed Honorary Physician to The King, 27th Dec., 1949, vice Maj.-Gen. John Cecil Alexander Dowse, *C.B., C.B.E., M.C., M.B.*, retired.
- (c) Maj.-Gen. Thomas Young, *O.B.E., M.B.*, late R.A.M.C., is appointed Honorary Physician to The King, 13th Jan., 1950, vice Lt.-Gen. Sir Neil Cantlie, *K.B.E., C.B., M.C., M.B., F.R.C.S., K.H.S.*
- (d) Brig. (temp. Maj.-Gen.) Francis Robert Henry Mollan, *C.B., O.B.E., M.C.*, late R.A.M.C., is appointed Honorary Surgeon to The King, 13th Jan., 1950, vice Col. David Fettes, *C.B.E., M.B., F.R.C.S.Edin.*, retired, re-employed.

RETIREMENTS

R.A.M.C. and late R.A.M.C.

Capt. (WS/Maj.) M. J. McSwiney (S.S./Spec.)	4.3.50 (Hon. Maj.)
Lt.-Col. W. D. Newland, <i>M.C.</i>	21.3.50 (Hon. Brig.)
Col. J. W. C. Stubbs, <i>D.S.O., M.C., M.B.</i>	14.3.50
Maj.-Gen. R. W. Galloway, <i>C.B., C.B.E., D.S.O., M.B., K.H.S.</i>	28.3.50
Capt. N. O'Beirn, <i>M.B. (S.S.C.) (disability)</i>	27.3.50

EDITORIAL NOTICES

The Editor will be glad to receive original communications upon professional subjects, travel, personal experiences, etc.

Correspondence on matters of interest to the Corps, and articles of a non-scientific character, may be accepted for publication under a *nom de plume*.

All Communications or Articles accepted and published in the "Journal of the Royal Army Medical Corps" will (unless the author notifies at the time of submission that he reserves the copyright of the article to himself) become the property of the Library and Journal Committee who will exercise full copyright powers concerning such Articles.

A free issue of twelve reprints will be made to contributors of Original Communications, and of twelve excerpts in the case of Lectures, Travels, Clinical and Other Notes. Such free reprints or excerpts will, however, owing to the shortage of paper, only be sent to those specifying their wish to have them, and a request for them should accompany the article when submitted for publication, the request being made in the form of a note at the foot of the manuscript.

Reprints or excerpts, additional to the above, can be furnished on payment if specially ordered at the time of submission of the article for publication.

Communications in regard to editorial business should be addressed—"The Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, A.M.D.2, War Office, London, S.W.1."

MANAGER'S NOTICES

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Communications in regard to subscriptions, change of address, etc., should be addressed "The Manager, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, A.M.D.1, War Office, London, S.W.1."

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COLONEL G. W. WILL, *O.B.E.*

MANAGER

MAJOR H. W. PECK, *R.A.M.C.*

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JUL 20 1950



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Journal of the Royal Army Medical Corps.

Editorial

ARMY HEALTH

RECENT years have seen a great widening of outlook in the struggle for the attainment of health. There has been a realization of the way in which the complicated interplay of all the factors which make up the environment of the individual may affect health. This change in outlook has been demonstrated in the establishment of the faculties of Social Medicine in our universities and the movement towards the expansion of our national social services has received a good deal of its impetus from the same basic causes.

The modern approach to army health has been inevitably associated with this general change in scope. Linked with this is the additional factor that the much increased tempo of modern warfare, combined with the ever-growing complexity of weapons, equipment and material demands a higher degree of mental and physical health than ever before.

The system of National Service has also had far-reaching effects. It imposes a special responsibility on the medical services in that the health of the youth of the nation is placed in the trust of the armed forces at a most important stage in their lives. If it imposes a responsibility, it also offers an opportunity, the opportunity of educating the young men of the nation in the principles of the attainment and maintenance of positive health in addition to the more tangible improvement in their physique.

The functions of the Army Health Service can be defined as the maintenance and enhancement of mental and physical health and efficiency and the prevention of disease. This can only be achieved by consideration of every detail of environment. The peculiar feature of Service life is the almost endless number of changes in environment which affect an individual in his Service career. Each of these environments must therefore be studied, the particular hazards defined and the preventive action taken, whether it be the provision of proper accommodation, special clothing, special diet, preventive inoculation or such measures as the proper psychological approach to arduous or boring conditions. These measures must cover in addition to the care of the soldier, the care of the soldier's wife and children.

Much thought has been given, in industry, to getting the right man into the right employment from the point of view of his physique, his mental capacity and his inclinations, since satisfactory adjustment to employment must be one of the fundamentals of happiness and health. The Army has developed schemes for medical classification and personal selection which aim at getting the individual into the right job and also enable the best to be got out of our national man-power resources.

Having fitted a man to a job the process may with advantage be reversed and the job studied in its relation to the man. Here the investigation and improvement of working conditions and hours, of the design of mechanical equipment and vehicles, of lighting, methods of relieving monotony and fatigue and of all the other aspects of occupational health produces a dividend in increased comfort, efficiency and contentment and therefore in health.

Having discussed the modern outlook in approach and in scope one may now consider the change in name. Properly the name "Hygiene," the cult of Hygeia, the Goddess of Health, could well cover the subject. In the popular view, however, the word hygiene had become so debased that it signified to many only the very restricted field of sanitation. Sanitation is still, of course, a vital factor and unless a high standard is maintained there will inevitably be an excessive loss of man-power through preventable disease in the tropics or sub-tropics but as has been shown the field is now very much wider. Hence the Directorate of Hygiene has become the Directorate of Army Health and a similar change of title has been effected throughout the various levels of the organization.

The duties of the Directorate of Army Health and of Army health personnel at all levels are primarily advisory. Their main task is the education of all in the science and art of the attainment and maintenance of health. Much can only be done by individuals themselves but much must also be done by the precept and example of all medical officers and regimental officers. In recent years the term "Health Discipline" has come into use. This is a combination of the traditional art of "man management" with the application and intelligent use of modern scientific methods for guarding against special risks. The problems of atomic and bacteriological warfare are likely to multiply the number of preventive and protective measures required.

The Army Hygiene Staff had a record of solid achievement, demonstrated by the steady improvement in the health of the soldier, of which they could well be proud. The Army Health Staff can look forward to similar progress in the future over a wider field.

Original Communications

FURTHER EXPERIENCE WITH STREPTOMYCIN IN THE TREATMENT OF TUBERCULOUS MENINGITIS

BY

Major R. L. RICHARDS

Royal Army Medical Corps (Medical Specialist)

IN a previous communication to this Journal Clarke (1949) reviewed our experience in the treatment of cases of tuberculous meningitis at the Military Hospital for Head Injuries. His paper dealt with the period from March 1947, when streptomycin first became available at the hospital, to the end of July 1948. The present report deals with those cases which have been under treatment in the thirteen months from August 1, 1948, to August 31, 1948.

In his Paper Clarke gave a very full and authoritative account of the history of streptomycin, its action, dosage, toxicity and methods of administration and discussed the importance of early diagnosis in relation to treatment with streptomycin. These subjects will therefore not be discussed further except in so far as they relate directly to the cases treated during the period under review.

CASES

During the thirteen months 15 patients have been under treatment (Table I). Of these, 3 (Cases 1-3) were still under treatment at the time of Clarke's report (his Cases 7-9). A fourth patient (Case 4) was also under treatment at that time but the diagnosis of tuberculous meningitis had not been established (this case is referred to on page 194 of Clarke's report). Of the remaining 11 patients, 9 were admitted during the year¹ with a presumptive diagnosis of tuberculous meningitis and 2 (Cases 5 and 6) developed tuberculous meningitis while in the hospital and receiving treatment for miliary tuberculosis. 11 of the patients were members of His Majesty's Forces; 10 were from the Army and 1 from the Royal Navy. The other 4 were children, sons of serving soldiers, and were admitted for treatment from Military Families Hospitals. A positive history of contact with cases of tuberculosis was obtained in only 3 cases (Cases 2, 12 and 13).

As can be seen from the data presented in Table I, in 7 cases the meningitis was part of a generalized miliary dissemination, in 2 it developed as a complication in patients with active pulmonary tuberculosis and in one it was secondary to caries of the thoracic spine. In 3 cases the only evident tuberculosis focus was a healed primary lung complex which was demonstrated on a radio-

¹Cases admitted during August 1949 have been excluded from this review.

graph of the chest in 1 case (Case 3) and found at autopsy in the other 2 (Cases 4 and 14). In 3 cases no primary focus could be found ; even after a full autopsy in Case 2.

The majority of the patients were admitted to hospital relatively early in the course of their illness and before they had received any treatment with streptomycin. Cases 13 and 14 were exceptional in that both had received treatment in hospitals elsewhere before coming under our care. The physical and mental state of the patients on admission varied greatly. Most had lost some weight and some were grossly emaciated (e.g. Case 9). All grades of consciousness were observed from those who were fully conscious, alert and rational, through mild euphoria and confusion to coma and delirium. All the patients with the exception of Case 6 presented the classical clinical features of meningitis at one time or another but signs indicating focal lesion of the central nervous system were observed in only about half of the cases.

PROBLEMS OF DIAGNOSIS

A diagnosis of tuberculous meningitis can be made with certainty only when the *Mycobacterium tuberculosis* is found in the cerebrospinal fluid either by direct examination of films or by culture or guinea-pig inoculation. The bacteriological methods in use at this hospital were described by Roberts (1949). Of the 15 cases at present under review, in all except 1 (Case 6) the diagnosis has been confirmed by one or more of these methods.

The problem of diagnosis may arise under two sets of circumstances :

(1) A patient with a known tuberculous infection may complain of symptoms suggestive of meningitis. In such a case if a lumbar puncture is performed and the cerebrospinal fluid is found to show an increase in cells and protein with a fall in sugar, the presumption that tuberculous meningitis has developed is so strong that it is justifiable to begin treatment with streptomycin without waiting for the demonstration of tubercle bacilli. This was the state of affairs in 5 cases in the present series (Cases 1, 5, 6, 7, and 8).

A word may be said about the development of meningitis in cases of miliary tuberculosis. It has been our practice to perform lumbar punctures once a week in every case of miliary tuberculosis once that diagnosis has been made and we have found that a slight increase in cells and protein is often the first sign of the onset of meningitis ; for example :

Case 5.—A 20-year-old private in the R.A.M.C. was admitted on 8.11.48 with a diagnosis of miliary tuberculosis. This diagnosis had been made overseas twenty-three days previously and he had already received eighteen days' treatment with intramuscular streptomycin. On admission, there were no signs of meningitis but choroidal tubercles were present in both eyes. His C.S.F. at this time showed : Cells—1 lymphocyte per c.mm.; protein—40 mg. per 100 c.c. His progress was uneventful until the seventy-third day of treatment when on a routine lumbar puncture the cells in the C.S.F. were found to have risen to 17 (12 polymorphs and 5 lymphocytes) per c.mm. ; and the protein to 100 mg. per 100 c.c. Four days later the cells were 96 per c.mm. and the protein 150 mg. per 100 c.c. At this stage there were no clinical signs of meningitis and his temperature and pulse did not indicate any change in his condition. Nevertheless the administration of intrathecal

streptomycin was begun. Three days later, he complained of headache and had neck rigidity and a bilateral positive Kernig's sign.

In this case the subsequent clinical course and the behaviour of the cellular and biochemical constituents of the cerebrospinal fluid left little doubt that the patient had tuberculous meningitis and the diagnosis was confirmed when a positive culture was obtained from cerebrospinal fluid withdrawn on the 121st day of treatment. The problem, however, is not always settled so easily, for example :

Case 6.—A 20-year-old corporal in the R.A.S.C. was admitted two days after a diagnosis of miliary tuberculosis had been made. There were no clinical signs of meningitis, no choroidal tubercles were seen and a normal C.S.F. was obtained on lumbar puncture. Treatment with systemic streptomycin was begun and weekly lumbar punctures performed. His progress was satisfactory until the twentieth day of treatment when the C.S.F. was found to contain : Cells—25 per c.mm. (52 per cent polymorphs and 48 per cent lymphocytes); protein—40 mg. per 100 c.c. There were no clinical signs of meningitis. Treatment with intrathecal streptomycin was started and although during the next week his C.S.F. showed a marked cellular response and the protein rose on one occasion as high as 110 mg. per 100 c.c. he never showed any clinical evidence of meningitis. After twenty-five days of intrathecal streptomycin his C.S.F. showed only 7 cells per c.mm. and 50 mg. of protein per 100 c.c. It was decided to discontinue the intrathecal streptomycin, and, although the cell count and protein level in the C.S.F. remained somewhat elevated for the next twenty-five days, his clinical condition gave no cause for concern. During the next six months his progress was uneventful and his C.S.F. remained normal.

The *Mycobacterium tuberculosis* was never found in this case and it may justifiably be asked whether this patient had a true tuberculous meningitis. It is known that patients with miliary tuberculosis may show transitory cellular responses and rises of protein in the cerebrospinal fluid and that these may subside spontaneously. These reactions may or may not be accompanied by clinical signs of meningitis and have been referred to as "tuberculous meningismus" (Cathie, 1949) or "serous meningitis" (Lincoln, 1947 and earlier writers). It is, however, very difficult to be certain that this was not a tuberculous meningitis which was diagnosed at the earliest opportunity and responded well to treatment.

(2) A patient who is not known to have suffered from tuberculosis or to have been in contact with cases of tuberculosis may develop tuberculous meningitis or miliary tuberculosis with a coincident meningitis. In such cases the early symptoms and signs may, as Clarke (1949) stressed, be vague and unrelated to the meninges or nervous system. At this stage, the diagnosis depends upon thinking of the possibility of tuberculous meningitis or miliary tuberculosis and taking the necessary steps to X-ray the chest and perform a lumbar puncture. The "snowstorm" appearance of the lungs or the cytological and biochemical changes in the cerebrospinal fluid will in most cases provide sufficient evidence on which to make a presumptive diagnosis and begin treatment. If there is any doubt about the diagnosis a Mantoux test can be of great help in these cases. 10 cases in the present series belonged to the group under discussion and in 8 of these a Mantoux test was performed on admission and found to be positive with dilutions of 1 : 1,000 Old Tuberculin or greater.

Sometimes there may be definite signs of meningitis and the diagnosis of tuberculous meningitis may be considered but the changes in the cerebrospinal fluid are atypical so that the diagnosis remains in doubt for some time; for example:

Case 4.—An 18-year-old private in the W.R.A.C. was admitted to hospital with a ten or twelve day history of headache, dizziness, nausea and stiff neck. She was drowsy with prominent signs of meningitis but there were no localizing signs in the central nervous system. Lumbar puncture was performed and the C.S.F. was found to be under normal pressure (110 mm.) with 172 white cells (30 per cent polymorphs and 70 per cent lymphocytes) per c.mm., protein 60 mg. per 100 c.c., chlorides 620 mg. per 100 c.c. and sugar 35 mg. per 100 c.c. A presumptive diagnosis of tuberculous meningitis was made and treatment with streptomycin commenced. The next day she had a well marked left hemiparesis which progressed during the following forty-eight hours to become a complete hemiplegia. Intrathecal and intramuscular streptomycin were given for fourteen days. During this period, her general condition improved although the hemiplegia did not and the C.S.F. showed a steady tendency towards normality so that at the end of the two weeks there were only 50 white cells per c.mm. and 70 mg. of protein per 100 c.c. As tubercle bacilli had not been found in films from the C.S.F. and the protein had never risen above 90 mg. per 100 c.c. the diagnosis of tuberculous meningitis was questioned and a decision was made to discontinue the intrathecal streptomycin and observe the effect. She continued to improve clinically and the C.S.F. also showed improvement. This was not at all what was anticipated would happen if the case were one of tuberculous meningitis and so, after seventy-four days, intramuscular streptomycin was also stopped. By 112 days she was able to be up and about despite her hemiplegia. The C.S.F. was not yet normal but contained 22 white cells (95 per cent lymphocytes) per c.mm. and 30 mg. of protein per 100 c.c. She was considered fit to go on leave. On the very day she went on leave a culture of a specimen of C.S.F. obtained on the second day of treatment was reported positive for *M. tuberculosis*. Fourteen days later she returned to hospital with a recurrence of her meningitis and on this occasion the C.S.F. findings were typical of tuberculous meningitis and numerous acid-fast bacilli were found on direct examination. Despite very intensive treatment with streptomycin this relapse ended fatally 401 days after she had originally started treatment.

This case is reported not only because it presented the most difficult diagnostic problem in the series but also because it illustrates some of the important points in treatment which are discussed later.

PROBLEMS OF TREATMENT

The present series of cases have been treated in accordance with a definite policy. Details of this policy have been given in previous publications by members of the group working in Oxford on the problem of tuberculous meningitis (Smith, Vollum & Cairns, 1948; Clarke, 1949; Taylor & Cairns, 1949). In clinical medicine, however, no policy can be rigidly adhered to since each patient presents as an individual problem. Thus, while throughout the period under review, the general policy of treatment remained unaltered, we were constantly faced with problems in the day-to-day management of each case. In this section some of the more important of these problems are discussed.

(1) *Dosage of Streptomycin and Routes of Administration.*—All the patients received treatment with streptomycin given intramuscularly and into the cerebrospinal fluid. Adult patients received 2 grm. of streptomycin intramus-

cularly in twenty-four hours. This was usually given as two injections, each of 1 gm., in the morning and evening. One patient with a very severe miliary infection received 3 gm. of streptomycin intramuscularly for thirty-four days (Case 9). As he was very emaciated this represented a very large dose of the drug and toxic effects were noted (*see below*). Two of the adult patients who were much underweight (Cases 4 and 5) were given rather smaller doses of streptomycin : 1 gm. and 1.5 gm. in twenty-four hours respectively. In the case of the children a daily intramuscular dose of rather more than 20 mg. per pound of body-weight was given.

The usual intrathecal dose for the adults was 100 mg., and, as soon as a presumptive diagnosis of tuberculous meningitis was made, this dose was given daily by the lumbar route. In one case the clinical condition of the patient was so grave and the findings of numerous bacilli in films from the cerebrospinal fluid indicated such a severe infection of the meninges that twice daily injections of 100 mg. were given intrathecally for the first thirty-eight days (Case 10). Some of the patients received one or more courses of intrathecal streptomycin by the lumbar route without any complication such as spinal block or severe bleeding arising but in others such difficulties either arose or it was suspected they might arise. In these cases it was our practice to make bifrontal burr-holes and to give streptomycin intraventricularly for a few days. It was our experience that, except in some of the children, this rest period was sufficient to allow conditions in the lumbar theca to settle down and the course could then be continued by daily lumbar punctures. The cisternal route was rarely used for giving streptomycin because we found that quite severe reactions were liable to follow the introduction of streptomycin into the cistern. On several occasions cisternal punctures were of help diagnostically, as the cerebrospinal fluid so obtained often gave a true picture of the activity of the meningitis at the base of the brain and, if such punctures were performed only occasionally during a course of intrathecal treatment, we could confirm that the lumbar cerebrospinal fluid findings were not complicated by the local traumatic effects of numerous punctures. If there was any suspicion of spinal block a cisternal puncture was performed some six to twelve hours after administration of a dose of streptomycin by the lumbar route and the streptomycin content of the cisternal fluid estimated. By this means we were satisfied that the intrathecal streptomycin was diffusing satisfactorily. If burr holes had already been made an estimation of the level of streptomycin in the ventricular fluid could likewise be used.

The dose of streptomycin given to the children by the lumbar route varied from 30 mg. for a five-month-old baby (Case 15) to 75 mg. for the older children. The amount given intraventricularly was rather less, 15 to 37.5 mg.

(2) *Duration of Streptomycin Treatment.*—The question of how long treatment should be continued is perhaps the most difficult of all problems to decide. There appears to be no doubt that, as a result of the initial wave of enthusiasm engendered by some of the immediate good results obtained with streptomycin in the treatment of tuberculous meningitis, there arose a tendency to think

in terms of the meningitis only and to forget that the condition is first and foremost an active tuberculous infection and, as such, requires prolonged treatment similar to that given to cases of active pulmonary tuberculosis or any other form of tuberculosis.

In the present series, when a presumptive diagnosis of tuberculous meningitis was made, every patient received streptomycin by both intrathecal and intramuscular routes. The first problem that had to be faced was when to stop the intrathecal injections. In the earlier cases of the series (e.g. Cases 1 and 3) a course of fifty to sixty daily injections was given and, if the patient's clinical condition was satisfactory, the course was stopped. With more experience of the disease certain more definite criteria for stopping an initial intrathecal course were later adopted.

- (i) The patient's general clinical condition must be quite satisfactory.
- (ii) At least sixty days must have elapsed since there were any definite signs of activity of the meningitis: e.g. sixty days must have passed since the last film was positive for tubercle bacilli or sixty days must have passed since any fresh neurological sign appeared.
- (iii) The white cell count and protein level in the cerebrospinal fluid must be falling or at least have maintained a "plateau" level for some days.

Using these criteria the longest continuous course of daily intrathecal injections was 123 days, for the first thirty-eight of which, as mentioned above, twice daily injections were given (Case 10).

In all cases of miliary tuberculosis with proved meningitis and in any other case in which progress was not satisfactory we have, since January 1949, given a second or even a third course of intrathecal injections (*see* Table I). Unless some untoward event occurred, thirty days' rest was given between courses and in the second and subsequent courses intrathecal injections were given every other day.

The minimal duration of systemic streptomycin treatment has been 180 days. Only two patients who have successfully completed a course of treatment have received such a short course. One of these (Case 3) relapsed thirty-six days after completing his first course (forty-eight days intrathecal and 180 days intramuscular) and has now successfully completed a second course of intrathecal (sixty days) and intramuscular (180 days) streptomycin. This patient has been exceptionally fortunate in that, neither during his initial meningitis, nor in his relapse did he develop any signs of involvement of the central nervous system. The other (Case 6) was the patient with miliary tuberculosis already referred to who may not have had a true tuberculous meningitis. Judged by recent experience it seems that the majority of patients require at least 270 days of treatment with streptomycin and many, including all cases of miliary tuberculosis with established meningitis, 365 days.

It is important to realize that the administration of streptomycin is only one aspect of the treatment of patients suffering from tuberculous meningitis. All the general measures adopted in the treatment of other forms of tubercu-

Case No.	Sex	Age	Family history or history of contact	Apparent source of infection	Mantoux test on admission	Condition on admission		Focal Neurological signs	Streptomycin treatment—days				Condition on 31.8.49	
						Mental	Physical		Intramuscular Course	Intrathecal Course	1	2		3
1	M	19	Negative	Spinal carries D6 & 7	+1/10,000	Unconscious, restless	Poor	R. 3rd nerve palsy	270	—	57	61*	—	Well. Off treatment 147 days
2	M	19	Positive	None found	+1/10,000	Drowsy, Incontinent	Poor	R. hemiplegia	211	46	66	44	—	Died 12.3.49
3	M	19	Negative	Primary lung complex	N.R.	Alert and oriented	Excellent	None	180	180	48	60	—	Well. Off treatment 55 days
4	F	18	Negative	Primary lung complex	+1/10,000	Drowsy	Fair	L. hemiplegia	74	275	14	42	155*	Died 27.8.49
5	M	20	Negative	Miliary	N.R.	Euphoric	Fair	Paraplegia	312	—	60	42*	61+	Continuing I.M. and I.T. treatment. Well
6	M	20	Negative	Miliary	+1/1,000	Alert and oriented	Good	None	180	—	26	—	—	Off treatment 55 days.
7	M	20	Negative	Miliary	+1/10,000	Euphoric	Fair	L. hemiparesis	138	—	74	—	—	Died 4.4.49
8	M	19	Negative	Active pulmonary tuberculosis	N.R.	Alert and oriented	Fair	Athetosis R. hand	155+	—	52	28*+	—	Still under treatment. Meningitis well controlled
9	M	18	Negative	Miliary	+1/1,000	Euphoric	Very poor	Deafness	175+	—	52	28*+	—	Still under treatment. Meningitis controlled. Miliary I.S.Q.
10	M	25	Negative	Active pulmonary tuberculosis	+1/10,000	Drowsy, confused	Poor	Transient hemiparesis L.	142+	—	123	—	—	Still under treatment. Much improved
11	M	2	Negative	Miliary	+1/100,000	Conscious, lethargic	Dehydrated	R. hemiparesis	22	—	22	—	—	Died 4.6.49
12	M	2½	Positive	None found	+1/1,000	Conscious, and alert	Fair	Decerebrate rigidity	104+	—	89	—	—	Continuing treatment. Progress only fair
13	M	3	Positive	Miliary	+1/10,000	Drowsy, fretful	Fair	None	121+	—	100	8*+	—	Continuing treatment. Good progress
14	M	21	Negative	Primary lung complex	N.R.	Conscious, irritable	Poor	Blind	85*	26	26	15	26	Died 21.7.49
15	M	5/12	Negative	Miliary	1/100,000	Alert	Good	Spasticity of all limbs	46	—	46	—	—	Died 28.8.49

N.R.—Not Recorded.

Streptomycin treatment: Figures thus: 18+—course unfinished on 31.8.49.

20* —course of injections given every other day.

*This was not a continuous course but was given as four short courses of twenty-six, fifteen, twenty-one and twenty-three days.

losis should be prescribed. Ideally, after the acute stage of the disease, treatment under sanatorium conditions is advisable and certainly an effort should be made to provide this for all patients during intervals between courses of intrathecal streptomycin and after they have completed intrathecal treatment. This has not been possible with all our cases but two patients (Cases 8 and 9) in whom the systemic infection appeared to be more important than the meningitis were given a short period at a sanatorium between courses of intrathecal streptomycin.

(3) *Toxic Effects of Streptomycin.*—Clarke (1949) listed four groups of toxic reactions that have been observed in patients undergoing treatment with streptomycin ; a histamine reaction, an anaphylactic reaction, disturbances of auditory and vestibular functions and irritation of the kidney. Of these the first and last have not proved troublesome in the present series. Several of the features of the anaphylactic reaction as described by Clarke have been observed. Nausea and vomiting are frequently troublesome especially during the early weeks of treatment. We found injections of hyoscine and the oral administration of benadryl both temporarily effective in reducing the incidence of vomiting which, however, usually subsided spontaneously after two to three weeks of treatment. A maculo-papular rash was seen in only one case and it was present before streptomycin therapy was begun. Eosinophilia was observed in one case (Case 6). A differential white cell count on the thirty-ninth day of treatment showed 22 per cent eosinophils ; the preceding and succeeding counts showed no eosinophilia.

All patients have shown evidence of disturbance of the functions of the eighth nerve. Characteristically this takes the form of a complete loss of vestibular function demonstrable, after approximately three weeks of treatment, by absence of the caloric responses and a loss of hearing for high tones recorded by audiometry. Fortunately, in the majority of cases the deafness is above the range of conversational tones and is not a disability to the patient. In two cases in the present series, the patients became completely deaf. Case 4 developed deafness in the left ear on the 150th day of treatment and in the right ear on the 244th day, and Case 9 in both ears on the 28th day. One other patient (Case 5) has a deafness in one ear that is within the range of conversational tones. This was noted clinically on the 278th day of treatment and confirmed by audiometry the next day. Deafness is a known neurological finding in both tuberculous and other forms of meningitis and we cannot be certain that in these instances it was due to the drug and not to the disease. Nevertheless, both the patients who became globally deaf were at the time receiving larger doses of streptomycin than we normally give and it is now generally recognized that streptomycin has a specific toxic effect on the vestibular and auditory apparatus. Dihydro-streptomycin is said to be less toxic in this respect but at the time of writing our experience with it is very limited.

On three occasions after an intrathecal injection a severe reaction was observed, consisting of peripheral circulatory collapse, sweating, flaccidity of all limbs, absence of all reflexes, nystagmus, inco-ordination, dysarthria

and incontinence of urine and fæces. The first symptoms appeared about six hours after the injections and the reactions were at their maxima at about twelve hours. On one occasion the patient became deeply unconscious. The evidence that two of these episodes were due to streptomycin is that the patients recovered from the reaction in thirty-six to forty-eight hours and that the streptomycin content of the lumbar cerebrospinal fluid twenty-four hours after the incriminated intrathecal dose was abnormally high on both occasions: 230 units per c.c. and 80 units per c.c. respectively. The third episode was exactly similar to the other two but following it the patient concerned (Case 4) had clinical signs of a lesion of the cauda equina which were permanent and there was no abnormality of the streptomycin content of the cerebrospinal fluid. None of the reactions was accompanied by clinical signs suggesting a flare up of the meningitis or with a rise in cells and protein in the cerebrospinal fluid. We suspect that these reactions may have been due to an overdose of streptomycin due to some error in making up the individual doses concerned but have not been able to prove this suspicion.

Details of one of these reactions are as follows:

Case 4.—At 1400 hours on the seventh day after her relapse (*see* p. 284) this girl was given her daily intrathecal injection of 100 mg. of streptomycin by the lumbar route. At 1600 hours she vomited and complained that her lower limbs “felt funny.” She was pale and had a rapid, weak pulse. The cranial nerves and upper limbs were as before but both lower limbs were flaccid. The left (hemiparetic) limb was paralysed and the right showed some general weakness but all movements could be performed. Reflexes could not be obtained from either lower limb. (As the reflexes on the left had been increased this was a most remarkable finding.) Sensation was unaffected. At 1730 hours, she volunteered the information that she felt better and that her legs were stronger. However, at 1900 hours she collapsed; her pulse was impalpable and there were pallor, sweating, and incontinence of fæces. Despite the administration of cardiac stimulants, she was still deeply comatose at 2230 hours; a response could be obtained only by strong supra-orbital pressure; the pupils were small, equal and reacted to light, all four limbs were flaccid and there was complete areflexia. Lumbar puncture was performed and the C.S.F. pressure was only 110 mm. At 0100 hours, the next day there were signs of recovery, her colour had improved and she was moving her upper limbs. Improvement continued and by 1000 hours she was talking although a little confused and very dysarthric. Nystagmus was present on lateral gaze in both directions. The limbs were still flaccid but, except for the pre-existing hemiparesis, power had returned almost to normal. There was marked ataxia of the right arm and leg. Both tendon-jerks and superficial reflexes were absent. Twenty-four hours later, her speech was normal, the reflexes had returned and apart from an amnesia for the whole episode there were no residual findings attributable to the reaction. The cerebrospinal fluid findings on the day of the reaction and the following day were as follows:

<i>Time</i>	<i>Total</i>	<i>White blood cells</i> <i>per c.mm.</i>		<i>Protein</i> <i>mg. per</i> <i>100 c.c.</i>	<i>Chlorides</i> <i>mg. per</i> <i>100 c.c.</i>	<i>Strepto-</i> <i>mycin</i> <i>Units per c.c.</i>
		<i>Polys.</i>	<i>Lymphos.</i>			
1400 hours (before reaction)	111	20%	80%	165	660	21
2300 hours (during reaction)	395	47%	53%	150	630	1020
1100 hours (day after reaction)	296	40%	60%	100	675	230

In addition to these specific toxic effects streptomycin undoubtedly has a general toxic action which is difficult to assess but is well appreciated by patients who are receiving the drug. Although during the last weeks of treatment patients whose progress is favourable may feel well, have good appetites and be gaining in weight satisfactorily, as soon as the drug is stopped they take on a new lease of life, have voracious appetites and during the first weeks of convalescence their gain in weight is much more rapid.

(4) *Causes of Failure of Streptomycin Treatment.*—6 patients in the present series of 15 died and it is of interest to consider why streptomycin treatment failed in these cases. First it may be stated that at the time of death all the patients had evidence of active tuberculous meningitis, that is to say they died of the disease and not of the effects of the disease. Failure to diagnose the disease in its early stages and hence delay in starting treatment is one reason for an unsuccessful result. In 3 of the fatal cases (Cases 2, 11 and 15) there was an interval of more than fourteen days between the onset of the illness and the administration of the first dose of streptomycin. Treatment may be ineffective because it is adequate and it may be inadequate either because insufficient streptomycin is given at each dose or because the course of treatment is too short. Case 14, in which most of the treatment was given elsewhere, comes under this heading; four short courses of systemic streptomycin, the longest being twenty-six days and two short courses of intrathecal streptomycin (twenty-six days and fifteen days) were given over a period of four months. The patient did well for a time but then relapsed. He was transferred to our care but died twenty-six days later. As already explained, failure to confirm the diagnosis led to Case 4 receiving an initial course of treatment which was inadequate judged by our standards. In view of the initial good response which was obtained it is probable that, had a full course of treatment been given then, the eventual fatal outcome might have been prevented.

In some cases despite adequate treatment, the infection rapidly gains the upper hand and death occurs in a relatively short period. Two of the children (Cases 11 and 15) died of an intense miliary infection after only twenty-two and forty-six days treatment respectively. In Case 7 an early diagnosis of meningitis was made in the presence of a previously diagnosed miliary tuberculosis. Intrathecal treatment was started immediately. Despite this he went rapidly downhill and died after seventy-four days. The presence of numerous tubercle bacilli in films made from the cerebrospinal fluid right up to the day of death showed that the meningitis had never been adequately controlled. Only two patients in the series died after surviving a long period of treatment (Cases 2 and 4). Case 4 has already been discussed above and on p. 284. In Case 2 the diagnosis of tuberculous meningitis was not made until approximately the fortieth day of the illness and when treatment started he was in very poor condition both mentally and physically. Nevertheless his progress was satisfactory for a time but then he became demented, and, after he had received sixty-six days of intrathecal treatment and 211 days of intramuscular treatment, streptomycin was stopped. He relapsed twenty-six days later and thereafter went steadily downhill.

It is thus apparent that in most of the fatal cases more than one adverse factor was present. The lessons to be learned from our fatalities are that we must endeavour to make the diagnosis early, to start treatment at once and to persevere with both systemic and intrathecal streptomycin in adequate dosage until there is good evidence that the meningitis is completely controlled.

Excluding the fatal cases only one patient in the present series relapsed after completing a course of treatment. Brief reference to this patient has already been made (p. 290).

Case 3¹.—A 19-year-old private commenced treatment on what was estimated to be the seventh day of his illness. His general condition was excellent and, apart from mild mental confusion, on one occasion, there were never any signs of involvement of the central nervous system. He was given forty-eight days of combined intrathecal and intramuscular treatment. His progress was so satisfactory that the intrathecal medication was then stopped. After fifty-seven days of treatment, he was allowed to get out of bed and at a hundred days was up all day and going out of the hospital on pass in the afternoons. Despite his good clinical condition his cerebrospinal fluid was still abnormal and intramuscular treatment was continued up to 180 days. At 203 days his C.S.F. showed 49 white cells per c.mm. (all lymphocytes), protein 65 mg. per 100 c.c., chlorides 730 mg. per 100 c.c., and sugar 52 mg. per 100 c.c. However, in view of the fact that he was well clinically and that he had been so active in the preceding weeks without any untoward result, it was decided that he should go on leave over Christmas. Fourteen days later he was readmitted with a history of headache and malaise for one week. There were signs of active meningitis and the C.S.F. now showed: white cells 212 per c.mm. (20 per cent polymorphs, 80 per cent lymphocytes), protein 210 mg. per 100 c.c., chlorides 650 mg. per 100 c.c. and sugar 55 mg. per 100 c.c. Tubercle bacilli were again found on direct examination of the fluid. Treatment was restarted and again rapid clinical improvement followed. Despite this a full course of sixty days combined treatment and 180 days intramuscular treatment was given. In view of the previous experience he was kept in bed during this period and thereafter resumption of activity was very gradual. On 31.8.49, twenty-nine days after stopping his second course of treatment and 456 days after he originally started treatment, he was apparently well and the C.S.F. showed only 5 white cells per c.mm. and 40 mg. of protein per 100 c.c.

The causes for this patient's relapse are not difficult to find. First, the all-important principle of prolonged rest as an essential part of the treatment was neglected. Secondly, we allowed ourselves to be influenced too much by the patient's general clinical condition and ignored the warning given by the cerebrospinal fluid findings that the meningitis was not yet quiescent. This case then illustrates two points which have already been stressed in this review, namely that it must not be forgotten that tuberculous meningitis is a form of active *tuberculosis* and that the administration of streptomycin should not be stopped until one is satisfied that the infection is adequately controlled.

RESULTS

Of the present series 3 patients (Cases 1, 3 and 6) have completed a course of treatment and are well at periods of up to 147 days after receiving treatment; these cases may be regarded as potential recoveries. 6 patients are still under treatment and 6 patients have died. If the 6 patients who had either completed

¹The early history of this case is given by Clarke (1949) Case 9.

treatment or died at the time of Clarke's (1949) report are also considered the following results have been obtained. From March 1947 to August 1949, 21 patients with tuberculous meningitis have been treated at this hospital. Of these 2 have recovered; they are now alive and well twenty-two months and twenty-one months after completing treatment (Clarke's Cases 1 and 2). 3 are potential recoveries (*see above*), 10 have died and 6 are still under treatment.

CONCLUSION

Further experience has confirmed the impression that streptomycin is a drug which exerts a profound influence upon the course of tuberculous meningitis. It is not an ideal drug but there is no doubt that in some cases it enables patients to recover from an illness which, before the introduction of streptomycin, was almost uniformly fatal. No hard and fast rules regarding treatment can be laid down and each case must be considered as an individual problem. To obtain the best results, streptomycin treatment should be started as early as possible in the course of the disease and the drug should be given both systemically and directly into the cerebrospinal fluid in adequate dosage and for a sufficiently long period. During treatment many problems arise and these are more easily solved if patients are treated by a specially trained team of nurses and medical officers. Nor must it be forgotten that tuberculous meningitis is an active tuberculous process and that patients suffering from it should be treated by a régime similar to that adopted for other active forms of the disease. An attitude of optimism towards the disease and perseverance with treatment will produce gratifying results even in cases which, at the outset, appear most unpromising.

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OBSERVATIONS ON THE VITAMIN B₂ COMPLEX DEFICIENCY SYNDROME IN WEST AFRICAN SOLDIERS¹

BY

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INTRODUCTION

DURING the summer of 1948 several medical officers in the Gold Coast District of West Africa Command reported the finding of cases of scrotal dermatitis among the African soldiers under their care. The present survey was carried out as part of a Command survey initiated by Lieut.-Colonel R. Boyd, R.A.M.C., the Assistant Director of Army Health, West Africa Command, on behalf of the Deputy Director of Medical Services.

929 African soldiers stationed in Accra were examined for evidence of vitamin B₂ complex deficiency. The main signs looked for were: (1) Cheilosis, (2) Angular stomatitis; (3) Glossitis; (4) Scrotal dermatitis; (5) A follicular rash.

Table I (pp. 294, 295) represents the findings in this investigation.

CLINICAL PICTURE

The severity of the symptoms in these cases varied independently of the severity of the physical signs. Several men with marked scrotal dermatitis and sore-looking tongues admitted to suffering any inconvenience only on direct questioning. On the other hand others appeared to be seriously troubled by these lesions. Only about 10 men reported sick of their own accord with symptoms relating to the condition under discussion.

A. Rapidity of Onset and Duration of Symptoms.—Many of the patients did not know or failed to remember how long their tongues or scrota had been sore and some had not noticed the condition at all. Altogether 22 men could

¹ This paper is based on a report submitted to the Deputy Director of Medical Services, West Africa Command, in October 1948.

TABLE I

Case number	Unit and No. of men examined	Physical signs					Duration in weeks	Weeks between last change of environment and onset of symptoms	Country of origin	Draws rations	Ration allowance	Comments
		Cracked lips	Angular stomatitis	Sore tongue	Scrotal dermatitis	Follicular rash						
1	HQ. Coy. 112	—	—	x	—	—	?	?	NT	x	—	? syphilis
2		—	—	x	—	—	?	?	T	x	—	
3		—	x	xx	—	—	?	?	GC	x	—	
4		—	—	x	—	—	?	?	GC	x	—	
5		—	—	x	—	—	?	?	GC	x	—	
6		—	—	x	—	—	?	?	GC	x	—	
7		—	—	x	—	—	?	?	NT	x	—	
8		—	—	x	—	—	?	?	NT	x	—	
9		—	x	x	x	—	?	?	T	x	—	
10	A. Coy. 46	—	xx	x	x	—	?	?	NT	x	—	Syphilis Kahn +
11		—	—	x	xxx	—	?	?	T	x	—	
12		—	x	xxx	xxx	—	?	?	T	x	—	
13		—	x	x	x	—	?	?	NT	x	—	
14		—	x	xxx	—	—	?	?	NT	x	—	
15		—	x	x	x	—	?	?	NT	x	—	
16		—	xx	xx	xxx	—	?	?	NT	x	—	
17		—	x	x	—	—	?	?	NT	x	—	
18		—	—	—	xxx	—	?	?	GC	x	—	
19	B. Coy. 64	x	—	—	—	—	?	?	NT	x	—	Kahn - Kahn -
20		—	—	—	xx	—	?	?	NT	x	—	
21		—	—	xxx	—	—	?	?	NT	x	—	
22		—	x	xx	—	—	?	?	NT	x	—	
23		—	—	x	x	—	?	?	NT	x	—	
24		—	—	—	x	x	?	?	GC	x	—	
25		—	—	x	—	—	?	?	NT	x	—	
26		—	—	xxx	—	—	?	?	GC	x	—	
27		—	—	x	xx	—	?	?	GC	x	—	
28	C. Coy. 64	—	—	x	x	—	?	?	T	x	—	Kahn - Syphilis Kahn +
29		—	—	xxx	—	—	?	?	NT	x	—	
30		—	—	x	x	—	?	?	T	x	—	
31		—	x	xx	—	—	?	?	GC	x	—	
32		—	x	xxx	xxx	—	?	?	NT	x	—	
33		—	—	x	x	—	?	?	NT	x	—	
34		—	—	xx	x	—	?	?	T	x	—	
35		—	x	xxx	xxx	—	?	?	GC	x	—	
36		—	—	xxx	xx	—	?	?	GC	x	—	
37	D. Coy. 63	—	—	x	x	—	?	?	T	x	—	? tinea
38		—	—	x	—	—	?	?	NT	x	—	
39		—	—	—	xx	—	?	?	T	x	—	
40		x	—	xx	xxx	xx	2	8	T	x	—	
41		—	—	—	x	—	?	?	NT	x	—	
42		—	—	xx	x	—	?	?	NT	x	—	
43		—	—	—	x	—	?	?	GC	x	—	

TABLE I—continued

Case number	Unit and No. of men examined	Physical signs					Duration in weeks	Weeks between last change of environment and onset of symptoms	Country of origin	Draws rations	Ration allowance	Comments
		Cracked lips	Angular stomatitis	Sore tongue	Scrotal dermatitis	Follicular rash						
44	Lt.	—	—	xx	—	—	?	?	T	x	—	Syphilis Kahn +
45	Batt.	—	—	—	xxx	xxx	3	8	T	x	—	
46		—	—	x	—	—	1	?	GC	x	—	? syphilis
47	129	—	—	xx	x	—	3	?	GC	x	—	
48		—	—	—	xx	—	?	?	IC	x	—	
49		x	—	—	—	—	?	?	N	x	—	
50		—	—	x	—	—	?	?	NT	x	—	
51	Records 70	—	—	—	x	—	?	?	GC	—	x	
52	HQ. Dist.	—	—	—	x	—	?	?	GC	—	x	
53	80	—	—	xx	—	—	?	?	GC	—	x	
	R.E. 10					No cases				x	—	
	DADOS 16					No cases				x	—	
54	821 Coy.	—	—	x	x	—	?	?	GC	x	—	38 draw ration allowance
	123											
55		x	x	xx	xx	→	14	0	N	x	—	
56		x	x	xx	xxx	x	3	13	N	x	—	
57		x	x	xxx	xxx	—	8	8	N	x	—	
58		—	x	xxx	—	—	16	?	GC	x	—	Syphilis Kahn +
59		—	x	xxx	xx	—	8	?	GC	x	—	
60		—	—	xxx	xxx	—	26	2	N	x	—	
61		—	x	x	xxx	x	21	3	SL	x	—	
62		x	x	xxx	—	—	12	4	N	x	—	
63		x	x	xxx	xxx	—	14	2	N	x	—	
64	MTTC.	x	x	xx	—	—	3	16	N	x	—	
65		—	x	xx	x	—	13	3	N	x	—	
66	111	—	—	—	x	—	3	13	N	x	—	? tinea
67		—	x	x	x	—	3	13	N	x	—	
68		—	—	xxx	—	—	?	?	GC	x	—	Syphilis Kahn +
69		—	—	xx	x	—	?	?	NT	x	—	
70		—	—	xx	x	—	13	3	N	x	—	
71		—	x	x	xx	xx	13	3	N	x	—	
72		—	—	xxx	—	—	2	34	N	x	—	? tinea
73		—	x	x	xx	—	14	2	N	x	—	
74		—	x	xx	xx	—	14	2	N	x	—	
75		x	xx	xxx	xxx	—	1½ yrs.	2	N	x	—	Most severe case
76		—	x	xxx	—	—	13	3	N	x	—	
77		—	—	—	x	—	14	2	N	x	—	
78	C.S.D.	—	x	xx	—	—	?	?	T	x	—	
79		x	—	x	—	—	?	?	NT	x	—	
80	41	—	—	—	x	—	?	?	GC	x	—	? tinea

Key x Mild case.
 xx Moderately severe.
 xxx Severe.
 NT Northern Territories.
 N Nigeria.

GC Gold Coast, Ashanti.
 T French and British Togoland.
 SL Sierra Leone.
 IC Ivory Coast.

give some details of the duration of their symptoms and the majority of these were Nigerians of the M.T.T.C. who had arrived from Nigeria four months previously.

The duration of symptoms is summarized in Table II below.

TABLE II

Case No.	40	45	47	55	56	57	59	60	61	62	63	64
Duration of symptoms (weeks) . .	2	3	3	14	3	8	8	26	21	12	14	3
No. of weeks from last known change of diet to onset . .	8	8	?	0	13	8	?	2	3	4	2	16

Case No.	65	67	70	71	72	73	74	75	76	77
Duration of symptoms (weeks) . .	13	3	13	13	2	14	14	1½ yrs.	13	14
No. of weeks from last known change of diet to onset . .	3	13	3	3	34	2	2	2	3	2

B. *Physical Signs*.—Table III shows the relative incidence of the signs found in these 70 cases.

TABLE III

	No. of cases	Percentage of total
1. Cheilosis	10	14.3
2. Angular stomatitis . .	26	37.1
3. Glossitis	56	80.0
4. Scrotal dermatitis . .	48	68.6
5. Follicular rash	6	8.6

(1) *Cheilosis*: The vermillion of the lips was found to be rather dry and sore. The mucous membrane over the inside of the lips was thickened, opaque and whitish.

(2) *Angular stomatitis*: The membrane at the angles of the mouth was desquamating, sodden and white. In case 77 this was so to a marked degree and caused the patient considerable discomfort in spite of which he had not reported sick of his own accord.

(3) *Glossitis*: The tongue presented a swollen, pale appearance. The mucous membrane in the milder cases was opaque and the epithelium at the edge of the tongue was flattened. In the more severe cases the epithelium had peeled in patches leaving a smooth, tender, pale area beneath. In these, the remaining fungiform papillae were prominent and hyperæmic and were usually on the sides of the tongue. This was sometimes indented by the teeth. Short narrow fissures were fairly common in the advanced cases. The mouth tended generally to be more moist than usual.

(4) *Scrotal dermatitis*: Frankland (1948) describes four stages in the production of scrotal dermatitis which was the second commonest sign in the syndrome seen in this survey (68.6 per cent of the cases).

- (i) Mild acute dry form.
- (ii) Severe chronic dry form.
- (iii) Chronic wet form.
- (iv) Ulcerated and œdematous form.

All the cases observed in this investigation were of the mild acute or severe chronic dry forms, i.e. in groups (i) and (ii). Glossitis was associated with the dermatitis in most cases.

The skin of the scrotum was affected mainly where it was overlain by the penis. The skin of the lower shaft of the penis was sometimes involved. A slight dryness of the skin was the first sign in mild cases, being increased both in extent and severity in others until in the most marked cases seen the skin was dry, thickened and scaly, the rugæ hypertrophied and the dermatitis spread to the adjacent area of the thighs.

(5) *Follicular Rash* : A follicular rash was seen in 6 cases but was widespread in 2 only. In these 2 the onset of the rash seemed to coincide roughly with the time of onset of the scrotal dermatitis. It was a non-suppurating folliculosis (distinct from the follicular keratosis of vitamin A deficiency (Platt, 1945), in one case covering the whole lower trunk and in the other the upper trunk and arms. The rash in all these cases is of doubtful significance and may have been a form of prickly heat.

These physical signs were not all necessarily found together in one person and this did not seem to depend just on the severity of the case. However, a marked glossitis unassociated with scrotal dermatitis was regarded as possibly of spirochaetal origin and not accepted by itself as due to hypovitaminosis unless a blood Kahn test had proved to be negative.

DIFFERENTIAL DIAGNOSIS

The conditions found to simulate this syndrome were :

- (i) "Geographical tongue" due to syphilis.
- (ii) Congenital fissured tongue.
- (iii) Tinea cruris.

The first two caused confusion in several cases but tinea was easily differentiated by its clear spreading edge and intense irritation even in mild cases.

Blood Kahn tests were performed in several cases who exhibited sore tongues but little else. 5 were positive, 2 doubtful and 4 negative.

INCIDENCE

Reference to table I gives us the following incidence of cases in the series :

Number of men examined	929
Number of cases with significant signs	80
Number of cases excluding those with a positive Kahn or scrotal lesions attributable to Tinea	70
Percentage incidence in 929 men	7.53

These may be classified as follows :

Mild cases (x)	3.12 per cent
Moderate (xx)	1.94 per cent
Severe (xxx)	2.47 per cent

RELATION TO DIET

At the time of this survey the majority of African troops stationed in Accra were drawing cooked rations according to a scale revised in 1946 and calculated to cover their requirements of calories, proteins, vitamins, etc. The following figures for the average daily intake of riboflavin and nicotinic acid have been calculated from the consumption over a theoretical specimen month. As this has been done with the aid of various published scales of food vitamin contents,¹ and not by direct analysis of specimen meals, the results can only be taken as a rough indication of the vitamin intake.

TABLE IV

	Riboflavin mg.	Nicotinic acid mg.
Normal daily requirements	3*	10-20†
Calculated average ..	1.61-3.33	34.35-47.14

(In each case the lower number is based on the lowest published food vitamin contents found and the higher on the maximum contents.)

* Sebrell *et al.* (1941).

† Bicknell and Prescott (1946).

Of the 70 men showing some signs of hypovitaminosis 67 were drawing cooked rations and only 3 were drawing a monetary ration allowance. Of the 176 men drawing ration allowance only these three showed signs of deficiency and then to a mild degree. All three were inhabitants of the Ashanti provinces (Cases 51, 52 and 53). It was particularly noticeable among the Nigerians that "Groundnut stew" was not eaten because these men found it unpalatable. This food contains a useful quantity of the B₂ complex vitamins, especially nicotinic acid.

TABLE V

Place of origin	Gold Coast NTs	Nigeria	Gold Coast Ashanti	Togoland	Sierra Leone	Ivory Coast
No. of patients from the area	23	18	15	12	1	1
Percentage of total (70)	32.9	25.7	21.4	17.1	1.4	1.4

Unfortunately exact figures showing the places of origin of all 929 soldiers are not available but probably about 40 per cent originated in the Northern Territories (NTs), 50 per cent in the Ashanti provinces and 10 per cent in the other areas. Among 111 soldiers examined in the M.T.T.C. there were 23 cases, 17 of whom had recently come from Nigeria to Accra to attend a

¹References are listed at the end of this paper.

course. In many of these cases their symptoms dated from two to three weeks after their arrival in Accra. The syndrome was so common among Nigerian troops that it was frequently referred to by the African nursing orderlies as the "Nigerian disease."

DISCUSSION

The clinical syndrome of cheilosis, angular stomatitis, glossitis, and scrotal dermatitis in man is now known to be due to deficiency in the diet of vitamins of the B₂ complex, especially riboflavin.

Stannus (1912) first mentioned the occurrence of scrotal dermatitis in describing "pellagra" in Nyasaland and later (Stannus, 1913) lists 19 cases with this sign in a series of 131 cases of "pellagra." Investigation has now shown that riboflavin is the most efficient component of the complex in curing the syndrome. Stannus (1944), however, points out that we cannot so far exclude the possibility of deficiency of other members of the vitamin B₂ complex playing some part in its production.

It is interesting to note that Jones *et al.* (1944) describing stomatitis due to riboflavin deficiency in 1,746 cases state that they found no patient with scrotal dermatitis. Their cases developed when the diet contained 1.0-1.28 mg. of riboflavin daily and no cases were seen when the riboflavin content was increased to 1.6 mg. Rapid cure was achieved by the administration of pure riboflavin or yeast but nicotinic acid or vitamin A were not effective. Similarly, Thompson and Freedman (1947) investigating an epidemic of the riboflavin deficiency syndrome in Indian troops describe only one case in a series of 100, with a "well-marked, scurfy dermatitis of the scrotum." Frankland (1948) on the other hand describes 551 cases of scrotal dermatitis in Allied prisoners of war in the Far East. Many of his cases were far more advanced than any seen in this series and were commonly accompanied by stomatitis, ocular changes and proctitis. They were markedly improved by the addition of Marmite or green vegetable extracts to their diet.

In the present series scrotal dermatitis was common, occurring in 48 out of 70 cases. This might suggest that the diet of many of the African troops in this area was bordering on an insufficiency of the B₂ complex vitamins but Lieut.-Colonel Boyd has pointed out that many of the soldiers miss the evening meal from time to time thus losing a valuable proportion of the vitamins. On the other hand the men commonly buy extra food at the native markets. Previous mention has been made of the fact that many soldiers not indigenous to this area did not partake of foods such as "Groundnut stew" because they found them distasteful and it was among these men that most of the cases were seen.

Table IV shows that the basic diet was adequate in nicotinic acid but possibly on the low side in riboflavin. In 92.47 per cent of the men seen, there was no clinical evidence of vitamin B₂ complex deficiency so that, in general, the deficiencies observed cannot justifiably be blamed on the standard ration scale.

TREATMENT

A proportion of the patients were given 6 "Compound Vitamin Tablets" daily. Each tablet contained: Aneurin 1 mg., riboflavin 1 mg., nicotinamide 10 mg., ascorbic acid 25 mg. Unfortunately we were unable to follow up these cases properly, but during the first week we observed a marked improvement in symptoms and physical signs in those men whom we were able to see again.

SUMMARY

(1) The results are presented of a survey of the vitamin B₂ complex deficiency syndrome in 929 West African soldiers.

(2) The clinical picture of cheilosis, angular stomatitis, glossitis, scrotal dermatitis and folliculosis is described and the differential diagnosis mentioned.

(3) 7.53 per cent of the 929 men examined showed some evidence of deficiency. The appearance of the syndrome is discussed in relation to diet and change of environment.

(4) The frequency of scrotal dermatitis in this series (68.6 per cent of all cases) is discussed in relation to the findings of previous observers. It is suggested that the ration scale for African troops in use in the summer of 1945 was adequate in the B₂ complex vitamins.

(5) Rapid improvement resulted when these patients were given tablets containing aneurin, riboflavin, nicotinamide and ascorbic acid.

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Brigadier Creagh emphasizes that he does not believe that this ration scale which is still in force is so deficient in riboflavin as to lead to a development of the syndrome *per se* and that other Regimental Medical Officers in the Command reported a minimal incidence of it. He does not agree that the syndrome was so common in Nigerian troops.

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TWO URINARY CARRIERS OF ENTERIC GROUP ORGANISMS PRESENTING SOME INTERESTING FEATURES

BY

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WHILE in general it would appear that faecal carriers of enteric group organisms are a greater source of danger than urinary, both on account of their higher incidence, and greater liability to chronicity or permanence (Vogelsang and Bøe, 1948), it has been shown that in Egypt urinary carriage is much more frequently detected than faecal (Ashton, 1947; Walton, 1949). It is also likely that, other things being equal, a urinary carrier will be the more dangerous type as a foodhandler since unnoticed contamination of the hands is more probable.

It was therefore decided to investigate further a number of urinary carriers detected in Egypt with special reference to the following aspects of urinary carriage :

(1) The duration of passage of the organism concerned in the urine and the possibility that this may be related to pre-existing urinary disease, especially schistosomiasis. Certain workers have suggested a possible relationship between these conditions, and a comparable correlation between pathological conditions of the gall-bladder and prolonged faecal carriage has been demonstrated (Vogelsang and Bøe).

(2) The virulence of the organisms voided in the urine. One of us (Dunbar, 1948) has shown that the organisms found in such cases may be rough and phage-contaminated. The influence of phage in inducing bacterial variations is known to be considerable and such modified strains may well be attenuated in virulence.

(3) The number of organisms passed ; since this is likely to influence the degree of infectivity and may be of importance in determining whether or not a concentration technique such as filtration, with use of the filter pad as an inoculum (Ashton), precipitation (Rappaport and Rosenknopf, 1948), or the use of selective media is necessary in the detection of carriers. Since Vogelsang and Bøe base their figures on direct plating their findings might not be comparable with those of workers using a concentration technique if such should prove to be necessary.

(4) The value of serological methods such as the demonstration of the presence

of urinary antibodies, faecal antibodies (Burrows and Havens, 1948; Harrison and Banvard, 1947) or, in appropriate cases, Vi antibodies in the blood, in the detection of carriers, and the estimation of their probable chronicity.

Though this investigation is in its early stages two cases are recorded presenting the following interesting features: carriage so far for over nine months; the passage of great numbers of organisms of low virulence; the presence of urinary antibodies; concurrent urinary schistosomiasis.

TECHNIQUE

(1) *Culture*.—Urine was collected in sterile bottles on three successive days at fortnightly intervals from each individual and brought straight to the laboratory. The first two specimens were kept in the refrigerator until the third had been obtained, when a pooled specimen of 30 ml. was prepared from the three from each person, incubated with an equal volume of selenite medium and subcultured. In addition all specimens were examined by adding known volumes of fresh urine to melted nutrient agar at 55° C., mixing by inversion, pouring plates, and incubating.

Isolated organisms were inoculated into "sugar" media and when necessary an attempt was made to promote flagellar agglutinability by passage through soft agar in Craigie tubes or plates. Viable counts in urine were made by using serial dilutions by the method of Miles and Misra, or by the inoculation of molten agar which was then poured as plates.

(2) *Virulence*.—A suspension was prepared by washing off the growth from overnight agar slopes. The bacterial content was determined by the use of Brown's opacity tubes. The suspension was tested for purity by inoculation of sugars and plates and 16–20 mice were inoculated intraperitoneally in batches of 4–6 with various doses of organisms contained in 0.5 ml. suspension and the survival rate after three days determined. Although it was realized that these numbers were too small for an accurate determination of the A.L.D., no more were available, and it was thought that the test as performed would indicate any gross change in virulence.

(3) *Urinary Antibodies*.—These were investigated by testing the urine against standard agglutinable suspensions by Dreyer's method without preliminary dilution. Tests were also carried out on urinary globulin concentrates. The results were compared with serum titres, and the albumen/globulin ratio in serum and urine was determined.

(4) *Schistosomiasis*.—The centrifuged deposit of the urine was microscopically examined for the ova of *Schistosoma haematobium*.

RESULTS

Case 1.—History.—This man, an Egyptian aged 19 years, was examined as a possible carrier in August 1948, apparently in connexion with a small outbreak of Paratyphoid B fever. An organism was isolated from his urine, which was thought to be *Bacterium paratyphosum* B. This was sent to the Central Pathology Laboratory, M.E.L.F., for typing. Results obtained were inconclusive and the strain, with others of established identity, was sent to the Central Enteric Reference Laboratory, London. It was found

to be rough and was passed to the Salmonella Reference Laboratory. Here the evidence of the "C" somatic structure (antigens VI and VII) was suggestive but owing to persistent roughness even after mouse passage identity could not be confirmed.

Present Investigation.—Examination of the urine was resumed in April 1949. In plates containing 3.0 ml. and 0.5 ml. urine a very heavy growth occurred. This consisted of an apparently pure culture of an organism which fermented glucose, mannite and dulcitol—but not lactose or saccharose—with the production of acid and gas. Indol was not formed. The growth in broth consisted of a granular deposit, the supernatant medium being generally quite clear. Attempts to determine the antigenic structure of this organism showed at first an absence of flagellar antigens c, b, 1, 2 or 5. In tests for somatic antigens some suspensions seemed sensitive to C. "O" serum but a tendency to auto-agglutination of reacting suspensions made these results inconclusive. Use was therefore made of soft agar cultures, by which means the antigen c was readily demonstrated. Certain subcultures also grew in broth with a degree of general turbidity and reacted satisfactorily with Para. C. "O" serum. This organism was provisionally identified as *Bact. paratyphosum* C. Subcultures were submitted for confirmation of identity to the Army Vaccine Laboratory. Here the flagellar antigens c, 1, 5 were identified but repeated attempts to differentiate between the somatic structure of *Bact. paratyphosum* C. and *Bact. cholerae* suis were unsuccessful. As regards biochemical activity the strain fermented arabinose but failed to ferment trehalose. This organism was invariably found in examinations carried out as described over a period of eight weeks.

Concurrent Disease.—All specimens of urine examined were turbid due to the presence of pus. Ova of *S. haematobium* were found on microscopic examination.

Virulence.—The average lethal dose (L.D. 50) for mice inoculated as described was found to be of the order of 400 million organisms. Recovery of organisms from the heart-blood of a mouse dying after inoculation with 1,000 million of the organism under investigation showed it to be still rough.

Weight of Infection.—A viable count carried out on one specimen of urine showed the presence of 40–50 million organisms per ml. urine. A blood culture was sterile.

Urinary Antibodies.—The urine passed on three occasions was tested for the presence of antibodies at titres of from 1/2.5 upwards. Serum antibodies were also investigated, at titres rising from 1/20. No antibodies were detected for the antigens b, VI or VII in either urine or serum but a standard Para. C. "H" specific suspension (antigen c) was agglutinated to 1/12.5 by each specimen of urine and to 1/320 by the serum which also agglutinated a VI typhoid suspension to the same titre. The last-mentioned reaction suggests that the isolated organism was in fact *S. paratyphosum* "C" while the absence of antibodies to b. adds support to the suggestion that this individual never was a carrier of *Bact. paratyphosum* B. Differential urinary and serum protein estimations showed an inverse A/G ratio in both; that for the serum being 0.65 : 1, and for urine 0.5 : 1.

Urinary percentages were approximately 1/10 of the serum figures. Titration of 10 times concentrated urinary globulins against antigens c and VI and VII gave positive results at 1/320 and 1/20 respectively.

Case II.—History.—There was some possibility of mistaken identity in this case as in June 1948 *Bact. typhosum* was isolated from a native foodhandler whose name was recorded as I. H. I.; on reporting this, however, it was discovered that no person of this name was known but that there was a cook I. M. I. Specimens from the latter were therefore examined with a negative result. Following the occurrence of cases of typhoid in June 1949, however, the urine of I. M. I. was again tested with the following result.

Present Investigation.—A very heavy growth of an organism fermenting glucose mannite and dulcitol—but not lactose or saccharose—with the production of acid only was obtained. Indol was not formed in peptone water. All attempts to demonstrate flagellar or somatic antigens of *Bact. typhosum* failed even following repeated cultures in soft agar, and colony selection. Two rabbits were therefore immunized with formalized cultures but subsequent

tests failed to demonstrate the production of antibodies to Typhoid "H" or "O" antigens, and the culture was insensitive to Vi phage. The biochemical reactions therefore remain the sole evidence of identity. The organism was found on each of the three series of examinations carried out.

Concurrent Disease.—Ova of *S. hæmatobium* were present in the urine.

Virulence.—All six mice survived a dose of 150 million organisms intraperitoneally for seventy-two hours, though the A.L.D. of a fully virulent strain of *Bact. typhosum* is of the order of 40–50 million organisms. Two mice were killed five days after inoculation and the heart blood cultured. Very scanty growth of rough organisms giving the biochemical reaction of the inoculated strain was obtained.

Weight of Infection.—A viable count carried out in the urine of this individual showed that the specimen contained approximately 60 million organisms per ml.

Urinary Antibodies.—The urinary protein was approximately one-eighth of the serum protein concentration. In this case the A/G ration was almost three times as high in the urine as in the serum. Serum antibodies showed a titre of 1/20 for T. "O" and 1/250 tr. for T. "H." Solutions of urinary protein of 10 times the concentration found in the urine gave titres of 1/20 for T. "O" and 1/40 for T. "H." The presence of these antibodies supports the identification of the isolated organism as *Bact. typhosum*.

Further observations on the weight of infection in urinary carriers.

Viable counts of organisms in the urine of 6 other carriers were made. In 3, ova of *Schistosoma hæmatobium* were also present. These included 1 carrier of *Bact. typhosum* whose urine contained 200 million organisms per ml., and 2 of *Bact. paratyphosum A.* with 7 million and 1 million organisms per ml. respectively. A fourth, in whose urine large quantities of blood and pus were present though ova were not seen, yielded 6 million *Bact. paratyphosum A.* per ml. The remaining two, both carriers of *Bact. typhosum* with no evidence of schistosomiasis, passed urine containing 9 million and 3 thousand organisms per ml. respectively.

SUMMARY AND CONCLUSIONS

(1) Two cases have been described in which there was prolonged urinary carriage by individuals with urinary schistosomiasis of enteric group organisms which were antigenically rough, of low virulence, and regularly present in enormous numbers.

(2) The influence of pre-existing disease on the persistence of the carrier state requires further investigation. Vogelsang and Bøe find that urinary excretion can in most cases be stopped by urinary disinfectants. Recent improved methods for the rapid and effective treatment of urinary schistosomiasis suggest the desirability of experimental treatment of all enteric urinary carriers liable to this complication with suitable urinary antiseptics to ascertain if, in those in whom it is actually present, cure of the schistosomiasis is an essential preliminary to an attempt to eliminate bacteria from the urine.

(3) The two organisms tested showed a low virulence for mice. This was associated with obvious antigenic roughness. It is perhaps not without significance in assessing the role of urinary carriers that whereas carriers of *Bact. paratyphosum C.* are relatively common as compared with carriers of the other enteric group organisms the incidence of paratyphoid fever due to this species is almost nil in the population at risk under observation.

(4) Urinary antibodies were demonstrated in low titre in the two cases

described. The ratio between urinary and serum antibody, however, would appear to suggest a leak of serum globulin into the urine from lesions of the urinary tract rather than the active antibody production there postulated by Burrows and Haven following findings in guinea-pigs.

Such a leak in the first case is further suggested by the identity of the A/G ratio in serum and urine.

(5) The presence of urinary antibodies may account for the antigenic deficiencies of the organisms passed by favouring the multiplication of a rough non-motile mutant, or such an effect may be produced by the influence of bacteriophage.

ACKNOWLEDGMENTS

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SOME ACCOUNT OF AN OPERATION IN THE MALAYAN JUNGLE

BY

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Royal Army Medical Corps

In April 1949 an operation was mounted with the object of surrounding and destroying a substantial force of bandits believed to have moved into the relatively inaccessible jungle area approximately midway between the Cameron Highlands and Kuala Lipis.

The whole operation was named Ramillies and the troops taking part were from the 2nd Bn. Coldstream Guards, with whom this account deals, and from 2/2 Gurkha Rifles and 2nd Bn. Malay Regt.

TOPOGRAPHY

The area in which the operation took place is crossed from west to east by three rivers, the Sungei Telom, Sungei Bertam and Sungei Lemoi which rise to the west of the Cameron Highlands, join in the centre of the area and continue as the Sungei Telom to Kuala Lipis.

The routes taken by the troops engaged were dictated by the terrain of high hills and river valleys and by the fact that the jungle paths commonly follow the courses of streams and rivers.

The two companies of 2nd Bn. Coldstream Guards had the most difficult routes to follow which were for most of the way along the S. Lemoi, Bertam and Telom from near their sources.

Between the rivers were mountains up to 5,815 ft., the highest point actually crossed by one party "Hermes" being 4,500 ft. and the lowest, near the confluence of the three rivers, about 800 ft. above sea-level.

The country was largely dense jungle with high trees and thick undergrowth of which the worst feature was the bamboo thickets. Occasionally there were small clearings in the jungle, either occupied, or at some time abandoned by the Sakai, the aboriginal jungle inhabitants. From the air, at a certain height, the country, typical of much of Malaya, looks extremely like an area of irregular pieces of the green sorbo sponge often used on cloth models.

As a whole the jungle is much more dense than encountered in Burma.

CLIMATE AND DISCOMFORTS

The terrain is difficult enough, but add to it a day temperature of about 92° F. maximum, and a night temperature of about 70° F. minimum, a humidity of about 90°, an unpredictable amount of rain, mosquitoes and midges, leeches

and biting ants, give the imagination some latitude, and an idea of the conditions under which this operation took place will have been visualized.

SOME ADMINISTRATIVE PROBLEMS

Many new administrative problems had to be faced, not the least of which was how to deal with any casualties which might occur after the first one or two days' march.

It will be appreciated that only absolutely fit men were permitted to set out on an operation of this nature, after a very thorough examination by the R.M.O.

Every ounce of weight counts when it has to be carried under these conditions. Hence only the minimum essential was carried, but even then, the weight carried per man amounted to about 62 lb. for a man armed with a sten, and even more for a man carrying a Number 68 wireless set or bren gun. The remarks of the orderly, who received a Winchester quart of tinea paint in an airdrop, concerning its disposal, can be imagined.

The Medical Officer was faced with a very big problem in choosing between what medical equipment must be carried, what he would like to carry, and what could be carried, even though he knew that he could probably obtain anything he required within a few hours by special airdrop.

Standard pattern stretchers in these conditions are weighty and cumbersome things and are not normally carried. Reliance is placed on improvised stretchers, or the airborne type is dropped to a patrol if a more rigid structure is essential. Stretcher carriage is an arduous undertaking and only in extremely favourable conditions is a four bearer carry possible.

The whole operation depended on maintenance by air supply. Unfortunately, evacuation of any sick or wounded by air was impossible. Helicopters may be the answer to this problem, as in most of the jungle there are clearings at intervals, which it is thought can be used by helicopters. There may be technical difficulties which the footslogger doesn't appreciate, but it is hoped that in due course helicopters will be available for trial as a method of evacuation.

In view of the total number of troops likely to be in the neighbourhood of the confluence of the three rivers, the unknown quantity and quality of the opposition, and the uncertainty of the length of the operation, the R.M.O. of the Coldstream Guards, Lieutenant M. M. F. Coigley, R.A.M.C., and Sgt. J. H. Watts, R.A.M.C., moved with the most southerly party along the S. Lemoi prepared to establish an aid post with six R.A.M.C. other ranks, if and when they met.

The S. Lemoi route was the longest and proved to be the most difficult. It was fortunate that the R.M.O. moved with this party as will be seen later.

HERMES

To face these conditions the two companies of 2nd Bn. Coldstream Guards divided into three parties of two platoons, each party having two R.A.M.C. other ranks from a Field Ambulance, moved eastwards from the Cameron

Highlands area on various dates in April, each party following generally one of the three rivers previously mentioned.

The party which included the R.M.O., total strength 52, was known as "Hermes" and left the 28th milestone on the Cameron Highlands road on April 12, all personnel being armed. They reached the same road near Ringlet on May 4 having travelled a distance computed at 55 miles, by the time jeep head in the Bertam Valley was reached, this distance excluding side patrols.

The general plan of movement was to march for three days, and to rest, "wash and brush up," and replenish on the fourth day. This permits airdrops at suitable intervals with replenishment up to the maximum that can be carried.

On a marching day the column moved for seven hours, in which time 10,000 yards (6 miles) on a good track, down to as little as 1,500 yards under very bad conditions was covered, though the distance on a good day was only in the region of 4-5,000 yards, as the crow flies.

It is believed that much of the route followed by "Hermes" had not previously been trodden by Europeans.

The jungle paths followed were very tortuous, sometimes steep, always undulating, commonly having a side-to-side slope. At certain points mutual assistance in movement was required, and bedding ropes or rifles were used.

DAILY ROUTINE

The daily routine followed was reveille at first light at 0700 hrs., move off at 0800 hrs. until about 1600 hrs. with appropriate short halts, and an hour's halt at mid-day.

The making of camp was started at about 1600 hrs., lean to shelters were put up made from suitable branches or bamboo and broad banana-type leaves, followed by the evening meal and thorough ablutions.

When camping near a stream it is inexcusable for anyone to fail to have a thorough wash. Fires were lit and wet clothes dried. On a replenishment day, clothes were washed. It was found to be most important that everyone slept clean and as far as possible a spare clean suit was kept for this purpose.

The fires also kept down the mosquito and midge population. The most depressing days, fortunately few, were those when it rained from the time of making camp to turning in, then it was impossible to dry wet clothes or to turn in dry.

Everything possible was done before turning in at 1900 hrs. to ensure an unhurried but early start on the following day.

AIR SUPPLY

"Hermes" lasted for twenty-three days and during that time major replenishment took place on five occasions. Medical supplies were dropped on the tenth and sixteenth days. In addition there was a free drop from an Auster, specially called for, later on the sixteenth day.

MEDICAL EQUIPMENT

The equipment carried on Hermes was "extensive" for that party, but

was taken to establish a reasonably equipped aid post in a suitable position for the whole force, if the necessity arose.

The alternative routes for the evacuation of any sick or wounded were (1) to carry back during the early days ; (2) to carry on and perhaps raft down the main stream of the Telom to Kuala Lipis during the middle period ; and (3) to carry forward. The actual decision could only be made in each individual case after taking into consideration the nature and severity of the casualty, the location at the time, and the past and probable future " going."

In the event, the only serious casualty was rested for two nights and then carried forward.

The main worry of the R.M.O. was the possibility of a penetrating abdominal wound.

A MAJOR CASUALTY

On April 27 a side patrol was out and the leading scout was shot by bandits and hit in the chest. It was late in the afternoon and too far to carry him to base during daylight. Morphine was given by the Officer Commanding the patrol and a first field dressing applied to the entry wound.

First thing on the following morning the R.M.O. and escort set out and met the patrol bringing in the casualty on an improvised stretcher.

On examination the R.M.O. found an entry wound on the left side of the chest in the sixth intercostal space in the nipple line. Very little bleeding had occurred and there appeared to be no penetration of the thoracic or abdominal cavities.

The Guardsman was brought back to base arriving at about 1530 hrs. and rested there for the following two nights. Treatment with adequate dosage of penicillin parenterally and sulphamezathine by mouth was instituted.

As the Guardsman's condition did not show signs of deterioration and the position of the bullet was unknown, neither probing nor an attempt to remove the bullet was made.

While the casualty was being brought in Sjt. Watts, R.A.M.C., with admirable initiative, prepared a bed made from twigs, leaves and the tow packing from that day's airdrop and sheets from the parachute silk, the whole being protected by a lean-to shelter.

An airborne pattern stretcher, medical supplies and plasma had been specially called for and arrived by Auster and were free-dropped.

The stretcher and medical supplies were undamaged but the plasma was a mixture of glass and globulin—fortunately not required.

The Guardsman recovered from his initial shock, and as his condition was extremely good, Hermes moved off again on the third morning after the incident.

The casualty was carried but got off the stretcher at the tortuous parts of the track or where the advance clearing party could not be expected to make the route passable for a stretcher.

The procedure which least exhausted the patrol, was for two men to carry for four minutes, then to change ends and carry for another four minutes.

At the end of this time the bearers were changed. This indicates just how exhausting the stretcher-carry was. Stretcher slings were found to be extremely useful and allowed the bearers to use their hands when necessary.

On reaching the S. Bertam and after a day's rest and replenishment, "Hermes" started off on the return journey via the Bertam Valley, the shortest route.

The casualty had now recovered considerably and was able to walk for increasing periods during the remaining few days and in fact walked through the worst part of the return journey, the whole party reaching jeep head in the Bertam Valley on May 4.

INCIDENCE OF DISABILITIES

A few cases of jungle boot sores occurred. These are shallow flat ulcers of an impetiginous nature limited to that part of the leg covered by the jungle boot, but particularly marked over the ankle. They are probably due to continued friction by the jungle boot and grains of sand, moisture, and a very low grade infection.

Treatment consists of cleaning the ulcers with a mild oxidizing agent, and "Attend B 14 days excused jungle boots."

The party "Hermes" had the lowest incidence of fresh tinea with only three cases (6 per cent) of tinea cruris, this was undoubtedly due to the higher standard of personal cleanliness, the result of the watchfulness of the R.M.O. His party had in addition 1 case of mild heat exhaustion, several cases of superficial sepsis of which 3 were deemed to require penicillin.

The party "Furious" had an incidence of 20 per cent of tinea and one "NYD Fever." The patrol "Neptune" for some reason had 35 per cent of fresh tinea cases and two cases of "NYD Fever."

The tinea figures are accurate because every man was carefully inspected before and after the operation.

Fortunately there were no sprained ankles or fractures. However, several severe cuts occurred while cutting bamboo, the R.M.O. was himself a victim and sutures were inserted in cold blood by Sjt. Watts, quite calmly, in spite of copious instructions in words of one and two syllables.

Cpl. Alberry, R.A.M.C., in one of the other patrols, sutured most excellently a nasty gash of 7 inches long, situated obliquely over the right scapula.

The question of suturing cuts by the R.A.M.C. other ranks particularly of the hands and fingers, gave rise to some discussion before the operation, but all cuts requiring suture were so treated and not one gave rise to any trouble. It is regretted that no note was made of whether sulphonamides and/or penicillin were used in these cases. An unsutured cut in the jungle is a great nuisance and handicap and is bound to become infected after a time, however carefully dressed.

MISCELLANEOUS POINTS

Several miscellaneous points are given here which were learnt during the operation or brought out more forcibly than before.

- (1) All men must wash completely once a day wherever possible.
- (2) Great attention must be paid to foot hygiene.
- (3) All water sterilizing tablets must be checked before an operation for their physical condition and sampled for efficiency of sterilization.
- (4) Zinc oxide and oil of cloves should be carried for toothache.
- (5) Footpowder of high quality must be used the whole time.
- (6) Smaller curved cutting needles and finer silkworm gut would be an improvement.
- (7) Treatment of tinea must be regularly carried out on patrol.
- (8) Insect repellant when properly applied is effective against mosquitoes.
- (9) Medical supplies by air must be packed in containers of small size. Bottles must be screw-capped as stoppers and corks are dislodged on impact with the ground.
- (10) Antimalaria clothing was found effective by those who wore it.
- (11) Lemonade crystals and fresh fruit are a welcome change in the ration.
- (12) Remove jungle boots at the end of each day's march.
- (13) Stretcher slings are extremely valuable.
- (14) On rest days, during daylight hours, only shorts and light footwear should be worn.
- (15) New replenishment clothing should be pre-washed and treated with D.B.P.

EXTRACTS FROM THE OFFICIAL REPORT

An extract from the official report is given : " The difficulties of dealing with any but minor casualties in the jungle cannot be over-emphasized.

" It is practically impossible to evacuate a seriously wounded man and to expect him to stand the jolting of the stretcher and the unpleasantness of the climate.

" To have carried the casualty referred to the whole way out would have taken one platoon from three to four weeks."

Two further extracts from the official report are given : " It is not considered that elephants would be any use for casualty evacuation. Many of the tracks are too steep for them to negotiate, they are very slow, and the narrowness of the tracks would mean that the casualty would be rubbed by branches and liable to be swept off."

" As was found during the war, one of the greatest morale raisers was the knowledge that if wounded, a man would be assured of speedy evacuation. This is not so in this area. . . ."

That helicopters may be the answer to these problems has already been mentioned.

CONCLUSION

Many lessons, which have proved of great value were learned from this operation, the largest and longest known to the writer at that time. In particular, a standard medical patrol pack for orderlies was devised and later amended from time to time, and a practical, improvised light-weight stretcher, made from bamboo and a groundsheet, has been introduced.

The need for a high standard of first-aid training for regimental personnel is self-evident.

To support long or large scale jungle operations, physically fit and well-trained R.A.M.C. other ranks are required. They must possess initiative and be capable of assuming considerable responsibility. They must be of a calibre which will gain the confidence of the combatant soldier. These requirements can only be found in men of a high selection group rating.

LIST OF CONTENTS OF R.M.O.'s MEDICAL PACK

Instrument roll (from Regimental Medical Pannier) complete	..	..	1
2 c.c. syringe in spirit tight case	..	..	1
10 c.c. syringe in spirit tight case	..	..	1
2 c.c. metal syringe in case	..	..	1
Ryle's Tube	..	..	1
Tourniquet—Samways	..	..	1
Upper universal dental forceps	..	..	1
Lower universal dental forceps	..	..	1
Injection soluble phenobarbitone	..	..	ampoules 6
Chloroform 2 oz. tubes	..	..	3
Pentothal 1 gramme tubes	..	..	4
Anti-gas-gangrene—bottle	..	..	1
Anti-tetanus serum—bottles	..	..	5
Anti-snake venom polyvalent lytholized sets	..	..	1
Cases hypodermic and ophthalmic	..	..	1
Injection coramine ampoules	..	..	4
Novutox 2 per cent 4 oz. bottle	..	..	1
Thermometer	..	..	1
Penicillin crystalline	..	..	mega units 1

Also gauze, Doctor's set, elastoplast dressings and zinc oxide plaster.

LIST OF CONTENTS OF R.A.M.C. SGT.'S MEDICAL PACK

Dressings No. 11 and No. 14 of each	..	..	6
Tab's aspirin	..	..	100
Tab's Codeine Co.	..	..	100
Tab's sulphaguanidine	..	..	100
Tab's sulphamezathine	..	..	200
Tab's laxative	..	..	100
Penicillin crystalline	..	..	mega units 1
Pulv. penicillin and sulphathiazole	..	..	grammes 50
Liquor iodi mitis	..	..	oz. 4
Lysol tablets	..	..	tins 1
Elastoplast doctors' sets	..	..	tins 1
Forceps artery	..	..	prs. 6
Forceps tongue	..	..	prs. 1
Forceps sinus	..	..	prs. 1
Forceps Dunhills	..	..	prs. 1
Schimmelbusch inhaler	..	..	1
Airway—waters	..	..	1
Catheters assorted	..	..	4
Pig. Castellani	..	..	oz. 4
Ung. Whitfield	..	..	oz. 4
Tourniquet—Samways	..	..	1

LIST OF CONTENTS OF AN R.A.M.C. ORDERLY'S MEDICAL
PATROL PACK

Liquor iodi mitis	..	..	..	..	..	..	..	oz.	2
Morphia Syrettes gr. $\frac{1}{2}$	..	..	..	..	..	..	..	..	6
Paraffin molle flav. 4 oz. tubes	..	..	..	..	..	..	..	..	4
Tablets solution lysol tins	..	..	..	..	..	..	..	..	1
Bandages compressed 1 in.	..	..	..	..	..	..	..	..	24
Bandages compressed 3 in.	..	..	..	..	..	..	..	..	24
Bandages compressed triangular	..	..	..	..	..	..	..	..	6
Lint 1 oz. packets	..	..	..	..	..	..	..	..	6
Gauze compressed $2\frac{1}{2}$ yards pkts.	..	..	..	..	..	..	..	..	12
Shell dressings	..	..	..	..	..	..	..	..	4
Tourniquet—Samways	..	..	..	..	..	..	..	..	1
Knives Bard Parker	..	..	..	..	..	..	..	..	1
Knives Bard Parker blades	..	..	..	..	..	..	..	..	6
Forceps artery	..	..	..	..	..	..	..	..	1
Scissors, stretcher bearers	..	..	..	..	..	..	..	prs.	1
Pins, safety	..	..	..	..	..	..	..	doz.	2
Silkworm gut	} Sterile in methylated spirit container							hanks	1
Needles, suture, triangular, curved									6
Thermometer, clinical	..	..	..	..	..	..	..	..	1

Tablets

Potassium permanganate tabs.	..	..	..	..	..	..	..	..	100
Aspirin tabs.	..	..	..	..	..	..	..	..	100
Cathartic tabs.	..	..	..	..	..	..	..	..	50
Sodium chloride tabs.	..	..	..	..	..	..	..	..	200
Euflavine tabs.	..	..	..	..	..	..	..	..	50
Cough tabs.	..	..	..	..	..	..	..	..	50
Sulphaguanidine tabs.	..	..	..	..	..	..	..	..	150
Paludrine tabs.	..	..	..	..	..	..	..	..	50
Tinea paint	..	..	..	..	..	..	..	oz.	4
Whitfield's ointment	..	..	..	..	..	..	..	oz.	4
Pulv. penicillin and sulphathiazole	..	..	..	..	..	..	..	grammes	50

RATIONS

(1) *Maximum Carried Per Man*

1/10 of 2 Composite Ration Packs (10 men) av. weight (incl. tins)	$= \frac{36 \times 2}{10} = 7.2$ lb.
2 Marching Ration av. weight (incl. tins)	$2\frac{1}{8} \times 2 = 4.25$ lb.
1 Marching Ration Reserve av. weight (incl. tins)	$= 2$ lb.
Approx. max. weight	$= 13$ lb.

(2) *Contents of Composite Ration Pack (10 Men)*

These are standard packings and therefore details are not given.

(3) *Marching Ration*

Contents : Preserved meat	..	..	..	..	4	oz.
Tea	..	..	..	..	1	oz.
Sugar	..	..	..	..	4	oz.
Milk	..	..	..	..	3	oz.
Dried fruit	..	..	..	..	4	oz.
Margarine	..	..	..	..	$1\frac{1}{2}$	oz.

Biscuits	..	..	..	..	..	6	oz.
Veal loaf or tinned bacon	..	..	..	..	..	1	oz.
Onions..	..	..	..	..	..	$\frac{1}{2}$	oz.
Rice	..	..	..	..	..	5	oz. (or rice 3 oz. oatmeal 2 oz.)
Chocolate	..	..	..	..	..	1	oz.
Salt	..	..	..	..	..	$\frac{1}{2}$	oz.
Salt tablets	..	..	..	..	..	As required	
Cheese	..	..	..	..	..	2	oz.
Weight						2 lb. 1 $\frac{1}{2}$	oz.

CLOTHING AND EQUIPMENT CARRIED

Clothing Necessaries and Equipment

(1) *Worn.*—Hat Jungle ; Shirt Cellular O.G. ; Vest Tropical ; Trousers Drill O.G. ; Drawers Cotton ; Socks Worsted ; Boots Jungle.

(2) *Carried.*—First Field Dressing ; Belt Waist ; Straps Shoulder ; Straps Supporting ; Pack W.E. '37 Pattern ; Bottles Water (full) ; Matchet and Sheath ; Cape, Monsoon (or Poncho), Sheet Ground, Lines Bedding, rolled and carried on pack.

(3) *Contents of Pack. W.E.*—Tins Mess ; Shirt Cellular O.G., 1 ; Trousers O.G., prs. 1 ; Vests Tropical, 2 ; Drawers Cotton, prs. 1 ; Shorts Drill O.G., prs. 1 ; Socks Worsted, prs. 2 ; Towels Hand, 2 ; Shoes Canvas, prs. 1 ; Washing Kit ; Outfits Water Sterilizing Individual, 1 ; D.M.P., containers 1 ; D.B.P., oz. 2 ; Salt Tablets, q.s. ; Paludrine Tablets, q.s. ; Footpowder, q.s. ; Rations, Variable.

Weight of above articles (Less Rations) = 36 lb.

(4) *Arms and Extra Equipment Carried according to Employment :*

							lb.	oz.
Pistol Revolver .38 and 18 rds., holster and pouch	..	..	..	..	..	..	3	4
Machine Carbine Sten and three magazines Sten full..	..	..	..	..	..	..	12	0
LMG (Bren)	..	..	..	..	..	..	25	0
Medical Pack	..	..	..	..	..	..	8	0
Bottle Water Medical (full)	..	..	..	..	..	..	6	10
Wrts 68 Set	..	..	..	..	..	..	34	0
Stretcher Airborne	..	..	..	..	..	..	15	0

HEALTH DISCIPLINE¹

BY

Lieutenant-General Sir NEIL CANTLIE, *K.B.E., C.B., F.R.C.S., K.H.P.*

FIELD-MARSHAL MONTGOMERY, in 1945, paid a remarkable tribute to the Royal Army Medical Corps when he wrote "to the Royal Army Medical Corps whose contribution to victory has been beyond all calculation." These are impressive words addressed by one of our greatest generals to the Army Medical Services which comprise the Royal Army Medical Corps, the Royal Army Dental Corps, and Queen Alexandra's Royal Army Nursing Corps. Never before have such glowing words been addressed by a British commander to army physicians, dentists, and nurses.

Field-Marshal Montgomery stressed five main points in the contribution that the Army Medical Services had made: (a) Forward surgery by the field surgical units; (b) blood transfusions and its availability in the forward units; (c) skilled nursing by Army nurses in forward areas; (d) penicillin and sulfonamides; and (e) air evacuation. These are all factors that have made the difference between life and death to the wounded man and they are all concerned with curative medicine. As a further contribution to victory, a sixth point can be added which is concerned with preventive medicine. It is called health discipline and defined as measures that concern the preservation of health and the prevention of disease which are enforced by disciplinary means. These six points contributed to victory because they conserved man-power, and the recovery of sick and wounded men in total war is of great importance to total man-power. Since man-power is ultimately a deciding factor in war, an efficient medical service has an important part to play.

The effective, and, at times, overwhelming part the medical services can play in war has been gradually recognized by military commanders in the field, and this has been especially emphasized where the campaigns have been fought in countries with low standards of health. None more so than in the recent campaigns in Burma and the Pacific. The campaign in Burma in 1942 showed the extent to which military operations could be dominated by malaria. In 1943 in Burma the morbidity rate caused by malaria was as high as 450 cases per 1,000 per month in certain forward units in contact with the enemy, where active service conditions seriously interfered with antimalarial measures. This may seem enormous at first, but remember that it is only 15 men out of a battalion of 1,000 strong, reporting each day with malaria. Although such high rates were exceptional, rates of 200 to 250 per 1,000 per month were

¹Reprinted from the *U.S. Armed Forces Medical Journal*.

common among forward troops. The commanders of formations saw their forces melting away and could do nothing to prevent it.

The accepted attitude was to lay the responsibility for health on the physicians' shoulders. The prevention of malaria was a physician's duty, almost a physician's fad to which the fighting soldier paid little attention. His job was to fight and defeat the enemy. It was not appreciated that unless the battle against disease was fought and won first, there would be no troops to defeat the enemy. The battalion or regimental medical officer did his best to persuade the troops to use mosquito nets when this was possible, and to smear on repellents when they were on patrol or sentry duty. The unit sanitary personnel used Paris green and oil on pools where mosquitoes bred, and drained away stagnant water. But essentially it was a medical matter and no concern of the fighting soldier whose mind was taken up with tactical plans to defeat the enemy. It is true that the unit commander was, by regulations, responsible for the health of his troops, but he relied on his medical officer to put any measures into effect, and these were limited to what the commander thought could be adopted under the existing conditions of active service.

The campaigns in Burma and New Guinea quickly showed that combat was impossible when medical recommendations were overruled. Then came the experiments of Fairley in Australia. He proved that when one tablet of atabrine was taken daily it was impossible to get malaria. He would never report sick with malaria, no matter how many times the man was bitten by infected mosquitoes, how much he suffered exposure and fatigue, or how cold or hungry he became. When Fairley reported the success of his experiments to the American and Australian commanders in the Pacific they were quick to grasp its importance.

One commander said: "You doctors think you can prevent malaria, but you can't. I can and I'm going to." By these words, "I am going to prevent malaria," the war in the Far East was revolutionized and victory was made possible. Prevention of malaria was taken out of the physician's hands and accepted by the staff. Commanders at once became responsible to assure that their soldiers did not acquire malaria, by seeing that the taking of atabrine was made a disciplinary matter. This was accomplished by requiring a daily message from commanders of regiments, brigades, and divisions to the effect that every man had taken his atabrine. It was as simple as that, but it took a little time before the significance of the change of policy was realized. The morbidity rates for malaria dropped spectacularly. In India, which was a non-operational area, in two years the malaria rate dropped from 248 to 34 per 1,000 per year. In West Africa the rate dropped from 900 in 1941 to 90 per 1,000 per year in 1945.

Commanding officers of units were responsible if the morbidity rate for malaria exceeded a maximum figure and one commander was relieved from duty for this reason. For the first time in history a unit commander was considered incompetent to command because he had allowed his men to become ineffective because of disease. Antimalarial precautions such as the

taking of atabrine, the use of DDT, and the provision of mosquito nets and veils, became measures as important or more important than the supply of ammunition ; and it became common practice in assault landings to land antimalarial supplies at least as soon as the ammunition, because ammunition was useless unless soldiers were there to use it, and a few hours of relaxed precaution, such as the failure of the supply of atabrine for twenty-four hours, would prove more dangerous than the failure to receive shells for the guns. As a result of the hard lessons of war this new doctrine, the active responsibility for the control of certain diseases rested with the general staff and no longer with the medical service evolved. This is the doctrine of health discipline.

This doctrine, and its corollary the control of disease opens up new tactical aspects of warfare. For example, if in a campaign one army has complete immunity from a particular disease because of its strict measures of health discipline, it could aim at forcing an enemy whose health measures were ineffective to fight in the most highly infected areas so that disease as well as bullets would lead to the defeat of the enemy. This occurred in Burma in 1945 when British and Indian troops were protected and the health discipline was of a high standard, while the Japanese army was decimated by malaria. We can, therefore, foresee that medical science may exercise an influence over the tactical aspects of a campaign in a country where endemic disease exists and where medical knowledge of one of the combatant forces has evolved a technique which is either unknown to or imperfectly used by the other. It follows that medical intelligence is of importance and may prove to be of great value in war. Medical intelligence means obtaining information of the diseases existing in other countries and the degree of medical knowledge that such countries possess.

The conception of the mingling of military tactics and medical science leads me to say a word about bacteriologic warfare. The bacteriologist is intimately concerned here with the actual means of destruction. We see him in the laboratory growing cultures with a view to spreading disease and death. Is this one of the prospects of advancing civilization ? We as physicians have previously known no medical secrets between nations ; medicine was international. There was no iron curtain until the future menace of bacteriologic warfare cast its shadow over us. Let us pray that as physicians we will never be asked to cause disease in or destroy our fellow beings. Our mission in life is to stamp out disease not to cause it, to prolong life not to shorten it.

The army medical services in war rise to a peak of importance that is sustained by the constant prospect of violent death in all its forms. The army physician becomes a saviour of life and a healer of pain, while the efficiency of the medical services may be the personal concern of every soldier in the field. In the last war, as the tribute from Field-Marshal Montgomery shows, our reputation has never stood so high. Our advice was accepted and enforced by commanders who wielded vast authority. It has always been the invariable experience that the lessons learned in the violence and tumult of war tend to become forgotten in the days of peace. The voice of the physician becomes a

still, small voice and a generation soon grows up which lacks the personal experience of the imminence of sudden mutilation or death.

It must be one of our great tasks in peace to keep alive this flame of health discipline, which was first kindled in the embers of war. We must not allow that great contribution to victory in the field to be cast aside and forgotten. Human nature, being forgetful of the past, will have to be constantly reminded of the part we have to play. Our soldiers in peace do not die of malaria, or scrub typhus, or dysentery—diseases which may decimate armies in the field. We can only accomplish this task by constantly emphasizing the lessons of the past to the present and future generations. We must keep our officers aware of the problems of health discipline and we must do this by lectures and by health education, which should be part of the syllabus of all combatant officers' training. I hope this policy will bring home to our staff officers who are responsible for future planning, that the medical services must be called in at an early stage and not forgotten, which has happened in the past. Our medical intelligence must be fully developed and the importance of this branch of military medicine should be re-emphasized. We must employ it with caution to avoid divulging secret information. For example, when, in 1942, the invasion of a certain country was being planned in great secrecy, the director of medical services of the force was engaged in a survey of the malarial problems that might be encountered. Wishing to know the habits of all the endemic varieties of anopheline mosquitoes so that effective control measures could be planned, he asked the entomologist what he knew of the habits of *Anopheles* "X." The entomologist replied, "What on earth do you want to know that for? It only exists in a limited area in . . ." (mentioning the country where the invasion was to occur). The director of medical services had to draw in his horns pretty quickly to avoid a serious leak in the invasion plan.

Health discipline must cover all those diseases that can be controlled by regulations enforced by authority. So far malaria has been dealt with exclusively, but there are other diseases that the advance of medical science can add to this category. It would be rash to make predictions, but it is suggested that scrub typhus, which was met in Burma, with its 20 per cent mortality, may shortly be controlled in the same way. Chloromycetin used prophylactically has been found to give favourable results. The active search for new antibiotics will no doubt produce new drugs which will unlock those doors which are still shut. If a drug effective as a prophylactic against bacillary dysentery could be produced then a standard of health discipline could be enforced that would do away with one of the scourges of armies in the past.

As for venereal disease, is it too much to hope that a drug may be discovered which when given prophylactically will prevent at least one of the venereal diseases? Will the time come when the disease controlled by a drug in this way would be made a matter of health discipline and would pass from medical to disciplinary control? This is dangerous ground, because moral principles are involved.

One of the medical consultants in Burma, from his personal experience in

the last war, laid the strongest emphasis on the necessity to shift our natural bias from curative to preventive medicine. He maintained that by multiplying the sanitary personnel in the forward areas and by intensive propaganda and health education we could attain a degree of health discipline that would materially reduce our hospital beds and hospital staffs. This is a point of view that merits serious thought and it is believed that greater efforts to inculcate health education followed by effective measures of health discipline would be sound. Recently the title of the Director of Hygiene at the War Office has been changed to Director of Army Health. It is believed that this alteration in title represents the change that is taking place in the conception of the duties of the Director, for emphasis is now laid on the study of positive health or what has sometimes been called functional medicine in distinction to curative and preventive medicine.

Finally, let us consider the measures of preventive medicine and health discipline that the soldier of future wars will be expected to undergo. He will be immunized against smallpox, the enteric group of fevers, tetanus, diphtheria, yellow fever, louse-borne typhus, and, if necessary, cholera and plague. Tuberculosis may soon be added to this list. From the point of view of health discipline he will be protected against malaria and probably scrub typhus and possibly at least one of the venereal diseases. Let us not forget the chemotherapeutic agents that each man may swallow if wounded.

We need not feel dissatisfied with the prospects of protection against disease afforded to our soldiers, but how much more satisfactory if a prophylactic drug effective against the dysenteries could be added to this list. Surely with the advances we can expect in antibiotics we cannot discard this as impossible. In conclusion, there is a story of an eminent American thinker who was once asked how he would have made the world different if he had been God. He replied, "To begin with I should have made health infectious instead of disease."

In the absence of perfection such as this, one of the great tasks of military medicine must be to send the soldier to war protected from those diseases that can be prevented, and by the powers of health discipline effectively wielded by the supreme commander in the field. The importance of health discipline has been stressed because we cannot allow the lessons of the last war to be forgotten. When for the first time in history a combatant officer was considered unfit to command a unit on the grounds that he had allowed his men to become ineffective through disease, a new day in military medicine dawned. The clouds of forgetfulness must not be allowed to overshadow the brightness of that day.

SOCIETY OF MEDICAL OFFICERS OF HEALTH MEETING OF SERVICES HYGIENE GROUP AT R.A.M. COLLEGE

THE Group, which is composed of "past and present" officers of all three Services, met at the College by invitation of the Commandant on March 22, 1950.

Amongst the members and guests present were the Deputy Director-General, Army Medical Services, the President of the Group (Air Commodore J. M. Kilpatrick); the Vice-Presidents (Sir George Elliston, Lt.-Col. H. D. Chalke (O.C. London Hygiene Company, T.A.) and Brigadier A. E. Richmond, now of the Ministry of Health); and Major-General T. Young (Director of Army Health), Air Commodore Lipscomb (Director of Hygiene, Air Ministry), Air Vice-Marshal J. McClurkin and Colonel W. W. S. Sharpe of the Ministry of Supply, Dr. Andrew Topping (Dean, London School of Hygiene & Tropical Medicine), Dr. G. M. Frizelle (Sub-Dean, London School of Hygiene and Tropical Medicine and Secretary of the Group); Colonel Hodgson, I.M.S. (retd.), Lt.-Col. E. F. W. Mackenzie (Metropolitan Water Board), Dr. J. A. Struthers (M.O.H. Holborn), Colonels F. C. Hilton-Sergeant (Army School of Health), A. E. Campbell (Professor of Army Health and A/Commandant, R.A.M. College), J. J. O'Dwyer (now of Unilever), Dr. G. D. Pirrie (L.C.C. Medical Staff), Dr. J. Craig Lindsay (M.O.H., Aldershot), Dr. V. Freeman (M.O.H., Islington), Dr. O. C. Dobson (Area County M.O.H., Middlesex), Lt.-Cols. C. L. Day, A. Meneces, D. W. Bell, R. W. Scott, Major S. Elliott, Majors M. M. Lewis and F. J. Ingham, Mr. Grundy and four St. Andrews University Cadets.

The evening's programme commenced with a showing of the new Army Health film "Health in Our Time."

In the Chemical Laboratory a series of bench demonstrations had been arranged by the Departments of Tropical Medicine & Entomology, Pathology, and Army Health. Subjects dealt with were the Dysenteries; Insecticides and Sprayers; Detergents; Water Sterilizing Tablets; Compound Vitamin tablets; the mounting of entomological specimens in Perspex; diagrams, etc., used in the teaching of entomology; antibiotics and recent developments; and the exo-erythrocytic phase of *P. falciparum*. The demonstrations were designed to represent recent advances of interest to Service Health Officers as well as methods and type of instruction used in the College.

From the modern lecture précis used in the Department of Army Health, visitors passed on to a viewing in the Library of the works of Parkes, de-Chaumont, Notter, Firth, Lelean and other former members of the College or Army Medical School Staff.

Also to be seen were some of the older writings on the health of the soldier. In these days many minds, both lay and medical, are giving much attention to

the improvement of communal health. Pringle in his "Observations on the Diseases of the Army" wrote in 1765: "I need scarce add that the preservatives from diseases are not to depend on medicines nor on anything which a soldier shall have in his power to neglect but upon such orders only at the same time that they do not appear unreasonable to him, he shall be made to obey." To read this in a beautifully bound copy with Sir James McGrigor's name on the fly-leaf was to glimpse an old view of the Army in the field not of war but of health education. There still seems to be plenty to learn and impart about the "preservatives from diseases" and it may be wondered if "orders" tend to be less "unreasonable."

The professional interest in the proceedings was gratifying and there was added pleasure in providing, with College resources, the occasion for a meeting of those with similar interests and service ranging from the "private enterprise" days before 1914 to that of present-day candidates for National Service.

GUEST NIGHT

A GUEST NIGHT was held at the Headquarter Mess on April 27, when Major-General Sir Ernest Cowell, *K.B.E., C.B., D.S.O., T.D., M.D., F.R.C.S.*, was "dined out" on the occasion of his retirement from active duty with the Territorial Army.

The Director-General proposed General Cowell's health in a short speech, which drew attention to the outstanding services which General Cowell had rendered both to the Territorial and to the Regular R.A.M.C. He had done pioneer work in Air Raid Surgery and had visited Barcelona during the Spanish Civil War to investigate at first hand the organization for these cases. His name would always be remembered for his work in connexion with the evacuation of casualties by air, and on wound shock in World War I. General Cowell's drill for the application of the Thomas's splint is the one which is now in force in the Corps. The Director-General then referred to his services during the last war, his active interest in the medical tactics of the forward medical units, his splendid work at Dunkirk, and his appointment as D.M.S. to the Forces in North Africa in 1942.

He was a Deputy Lieutenant for the County of Surrey and a Freeman of the Borough of Croydon.

General Cowell in his reply proceeded to give some reminiscences of his military career and referred to the shortage of surgical teams which had characterized World War I; the part which he had taken in the reorganization of the field medical units with the Hartgill Committee and emphasized how desirable it was that we should adopt close co-operation with the American Forces.

Amongst other guests present were Sir George Turner, Permanent Under-Secretary of State for War, and Lieutenant-General Sir John Whiteley, Deputy Chief of the Imperial General Staff, and many Territorial officers.

A message of sympathy on his illness was sent to Major-General Galloway, who had been unable to attend as a Mess guest on the occasion of his retirement.

Obituary

Lieut.-Colonel FRANCIS JAMES PALMER

Lieut.-Colonel Francis James Palmer, R.A.M.C., Retired, died in West Southborne, Bournemouth, on April 6, 1950, in his seventy-fifth year. He was born in Donnybrook, Co. Dublin, qualified in 1898 and took the F.R.C.S.I. in 1907. He was Commissioned in July 1899 and retired in the rank of Lieut.-Colonel in March 1923.

He served in South Africa from 1899 to 1902 and saw many actions while taking part in many operations. Twice mentioned in despatches he was awarded the Queen's Medal with six clasps and the King's Medal with two clasps.

He served in Mesopotamia from November 1914 until March 1917, was twice mentioned in despatches and was awarded the 1914-15 Star, British War and Victory Medals.

His son, Colonel Philip Francis Palmer, *O.B.E.*, late R.A.M.C., is still serving.

Lieut.-Colonel HENRY LAWRENCE WEEKES NORRINGTON, *D.S.O.*

Lieut.-Colonel Henry Lawrence Weekes Norrington, *D.S.O.*, R.A.M.C., Retired, died on April 14, 1950, in his seventy-eighth year. He was born in Clifton, Bristol, qualified in 1897 and was commissioned the same year. He retired in the rank of Lieut.-Colonel in April 1919.

He had served in the Nile Expedition of 1898, with the International Force occupying Scutari and Albania in 1914; thereafter in France from October 1914 to February 1918.

He was mentioned in despatches, received the *D.S.O.*, 1914 Star, British War and Victory Medals.

Lieut.-Colonel FERDINAND SIMEON LE QUESNE, *V.C.*

Lieut.-Colonel Ferdinand Simeon le Quesne, *V.C.*, R.A.M.C., Retired, died in Clifton, Bristol, on April 14, 1950. He was born in Jersey in 1863, qualified in 1886, was appointed Surgeon in July 1886 and retired as Lieutenant-Colonel in December 1918.

He was awarded the *V.C.* during operations against the Chins (Burma) in 1889. The *London Gazette* of October 29, 1899, said: "During the attack on the village of Tartum, he remained close to the enemy's stockade under a

continuous fire for nearly a quarter of an hour dressing the wounds of Lieutenant Michael of the Norfolk Regiment who afterwards died. The doctor was severely wounded himself soon afterwards in attending to another officer."

He saw further service with the Chin Luskai Expedition in 1890. Again he served in South Africa in 1901 and 1902 and yet again in France from August to December 1914.

He had, in addition to the V.C., the Burma Medal with two clasps; the Queen's South Africa Medal with three clasps; the 1914 Star, the British War and Victory Medals.

He was brought to notice for valuable services rendered in the list published on February 24, 1917.

The Times of April 18, 1950, says he was a fine shot in his younger days and an able player at rackets and lawn tennis.

Who's Who says his recreations were shooting, tennis and rackets.

Captain ARTHUR RODD

Captain Arthur Rodd, R.A.M.C., Retired, died in Yelverton, South Devon, on April 16, 1950.

Born in April 1895 he qualified in 1916. He joined the Special Reserve in November 1916 and was given a Regular Commission in June 1918. He retired in January 1932 on account of ill-health contracted on active service.

He served in Mesopotamia from March 1917 to January 1918; with the Egyptian Expeditionary Force from January to March 1918 and in France from April 1918 to the end of the War. He was wounded and received the British War and Victory Medals.

The Times of April 20, 1950, in an obituary states he was jointly responsible with Lord Astor for saving Buckland Abbey, the home of Sir Francis Drake, for the Nation. It further states that he bought the estate after an agreement between him and Lord Astor, who conducted the negotiations whereby the National Trust agreed to own and hold the Abbey and tithe barn.

NOTES

MAJOR-GENERAL F. K. NORRIS, the Director-General of the Australian Army Medical Services, is visiting this country and will be making a tour of Army medical and dental installations during the summer.

Major-General and Mrs. Norris have been invited to attend the At Home at the R.A.M. College on June 23 and Major-General Norris to attend the Annual Dinner that evening.

DR. PERRIN LONG of the Johns Hopkins University, Baltimore, has consented to give two addresses at the R.A.M. College during May on the subject of antibiotics.

Extracts from the "London Gazette"

PROMOTIONS

R.A.M.C.

To be Colonels :

Lt.-Col. J. H. Anderson	20.3.50
Lt.-Col. J. E. Swyer	28.3.50

To be Lt.-Cols. :

Major G. A. E. Harman, M.B.	12.1.50
Major P. H. Ball	20.3.50
Major D. R. Cattenach, M.B.	28.3.50

To be Majors :

Capt. I. N. S. Heald, M.B.	21.2.50
Capt. H. J. Anderson, M.B. (with sen. next below Maj. F. MacD. Byrn). (Substituted for the notifi. in <i>Gazette</i> (Supp.) dated 8.11.46.)	1.7.46
Capt. P. W. Kippax, M.B.	4.4.50

To be Capt. :

Lieut. E. L. Dawe, M.B.	2.1.50
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APPOINTMENTS TO REGULAR AND SHORT SERVICE COMMISSIONS

R.A.M.C.

War Subs. Major (Hon. Lt.-Col.) Roderick Macdonald, M.B., from Emerg. Commn. to be Lt. S.S.C. (without pay & allces.) 5th Apr. 1950, and is granted the actg. unpaid rank of Lt.-Col., temporarily relinquishing the hon. rank of Lt.-Col.

Capt. James Alphonso McCusker, M.B., from Emerg. Commn. to be Capt., 24.3.50, retaining his present seniority.

War Subs. Capt. William Semple Millar from Emerg. Commn., is apptd. to a Reg. Short Serv. Commn., 14th Apr. 1947, in the rank of Capt. (Substituted for the notifi. in *Gazette* (Supp.) dated 6th May, 1947.)

Lt. (War Subs. Capt.) James Francis Louis Lyons, M.B., from Emerg. Commn. to be Capt., 14th Apr., 1947, retaining present seniority. (Substituted for the notifi. in *London Gazette* (Supp.) dated 6th May, 1947.)

SPECIAL APPOINTMENTS

Maj.-Gen. (Hon. Lt.-Gen.) Sir Treffry Owen Thompson, *K.C.S.I.*, *C.B.*, *C.B.E.*, *D.M.*, late *R.A.M.C.* ret'd., is apptd. Colonel Commandant 2nd Feb. 1950, vice Maj.-Gen. Sir Percy Stanley Tomlinson, *K.B.E.*, *C.B.*, *D.S.O.*, *F.R.C.P.*(Lond.), resigned.

RETIREMENTS

R.A.M.C. and Late R.A.M.C.

Lt.-Col. C. Wilson, M.B.	1.4.50 (Hon. Col.)
Col. R. R. Evans, M.D. (disability)	20.3.50
Capt. G. M. A. Lynch, M.B.	15.4.40 (Hon. Maj.)
Capt. R. B. Crombie, M.B.	18.4.50 (Hon. Maj.)
Capt. R. M. Lang, M.B.	30.4.50

R.A.D.C.

Lt.-Col. W. A. McClelland (disability)	4.4.50
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JOURNALS RECEIVED

THE following journals have been received and are available in the Library of the R.A.M. College :

Practitioner, Military Surgeon, Medical Press, Bull. of Hygiene, Medical Journal of Australia, Royal Engineers Journal, Lancet, B.M.J., South African Medical Journal, Indian Journal of Medical Research, Journal of the Royal Sanitary Institute, Glasgow Medical Journal, Bull. of the John Hopkins Hospital, Indian Journal of Malariology, Post Grad. Medical Journal, Journal of the Royal Inst. of Public Health and Hygiene, St. Barts. Hospital Journal, Wish Stream, British Medical Bulletin, Chronicle of World Health Organisation, Revista de Medicina Militar, Belgisch Tydschrift voor Militaire Geneeskunde, Proc. of the Royal Soc. of Medicine, Journal of the R.A.S.C., Bull. International des Services de Sante, Tropical Diseases Bull., Edinburgh Medical Journal, Journal of R.A.V.C., Clinical Proceedings, British Journal of Dermatology and Syph., Indian Medical Gazette, Journal of the Royal Egyptian Medical Assn., East African Journal, Revue du Corps de Sante Militaire, Archivos del Hospital Universitaid, Quarterly Journal of Medicine, Military Review.

CHANGE OF EDITORSHIP

COLONEL WILL is giving up the editorship of the Journal on July 1, 1950, at his own request, and Lieutenant-General Sir TREFFRY O. THOMPSON will be his successor.

I am sure all readers of the Journal will join with me in expressing our thanks to Colonel Will for all his hard work since he took over this appointment in October 1944.

The Journal has been through a very difficult period since the end of the war because there has been a reduction in the number of subscribers, and a consequent loss of revenue, chiefly due to officers being financially less well off.

The task of editor is always an exacting and onerous one and never more so than when he is faced with a falling circulation and a shortage of articles for publication, a situation which Colonel Will has had to contend with for a long time. This led me to put out an appeal quite recently, and as a result of this and other measures the editor tells me that the Journal is now in the happy position of having more material than for some time past. Colonel Will is therefore handing over to his successor at a time when we hope the lean years are at an end.

The editor has always been imbued with the necessity of maintaining the highest possible standard and we all owe him a tribute for the effective way he has managed to do this while contending with all the difficulties I have mentioned.

He has been a worthy successor to our distinguished editors of the past.

EDITORIAL NOTICES

The Editor will be glad to receive original communications upon professional subjects, travel, personal experiences, etc.

Correspondence on matters of interest to the Corps, and articles of a non-scientific character, may be accepted for publication under a *nom de plume*.

All Communications or Articles accepted and published in the "Journal of the Royal Army Medical Corps" will (unless the author notifies at the time of submission that he reserves the copyright of the article to himself) become the property of the Library and Journal Committee who will exercise full copyright powers concerning such Articles.

A free issue of twelve reprints will be made to contributors of Original Communications, and of twelve excerpts in the case of Lectures, Travels, Clinical and Other Notes. Such free reprints or excerpts will, however, owing to the shortage of paper, only be sent to those specifying their wish to have them, and a request for them should accompany the article when submitted for publication, the request being made in the form of a note at the foot of the manuscript.

Reprints or excerpts, additional to the above, can be furnished on payment if specially ordered at the time of submission of the article for publication.

Communications in regard to editorial business should be addressed—"The Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, A.M.D.2, War Office, London, S.W.1."

MANAGER'S NOTICES

The Annual Subscription for the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS is £1 payable in advance. Single copies, 2s. 6d. per copy.

Cheques, etc., should be made payable to the "Journal R.A.M.C.," and crossed "Holt & Co."

Communications in regard to subscriptions, change of address, etc., should be addressed "The Manager, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, A.M.D.1, War Office, London, S.W.1."

ADVERTISEMENTS

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TITCHFIELD STREET, LONDON, W.1. TELEPHONE: MUSEUM 2077.

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CORRIGENDA

VOL. XCV, No. 6, December 1950

Page 318, line 35,

$$\text{for } \sqrt{\frac{2 \cdot 6^2}{6000} + \frac{2 \cdot 5}{5000}} \quad \text{read} \quad \sqrt{\frac{2 \cdot 6^2}{6000} + \frac{2 \cdot 5^2}{5000}}$$

Page 319, line 40,

for "in the above table," read "in Table V."

Page 323, line 5,

for "standard error of r is $1 - \frac{r^2}{\sqrt{N}}$,"read "standard error of r is $\frac{1 - r^2}{\sqrt{N}}$."

Page 324, line 13,

for "p. 000," read "p. 272."

Page 326,

The table should be completed by adding six vertical lines.
one on each side of columns, I, II, III, IV, and Totals

Page 328,

line 25, for "43·200," read "43200"

line 27, for "8·100," read "8100"

line 31, for "122·779," read "122779"

July 1950

No. 1

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Journal

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Royal Army Medical Corps

ISSUED



MONTHLY

EDITOR

LIEUT.-GENERAL SIR TREFFRY THOMPSON,
K.C.S.I., C.B., C.B.E., M.A., D.M.

MANAGER

MAJOR H. W. PECK, R.A.M.C.

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Journal of the Royal Army Medical Corps.

Original Communications

THE OLD SOLDIER

BY

Colonel D. P. HOLMES, T.D., M.D., D.P.H.
Commanding 3 (Western) General Hospital T.A.

ONE recalls duties during wartime in which one was intimately connected with the health of the serving soldier and of writing a great deal thereon. It has been suggested that the health of the old soldier is less widely described and that his welfare might interest many. Further it has been pointed out that comparatively few people are directly concerned with such. The discharged man mingles with the rest of the community and becomes a part of it. As a class "the Old Soldier" can probably only be studied in hospitals of the type of those of the Ministry of Pensions, our dear old friends of Chelsea not being of necessity unfit men.

One has had a personal association with Ministry of Pensions Hospitals for a number of years, and one feels considerable pleasure that someone might like to hear about them and their personnel. It is at this point that difficulties arise in one's mind. What is to be recorded as of interest? The strictly scientific may be discarded at the outset. This can be read elsewhere, as the inner workings of "the Old Soldier's" body are much the same as of other peoples! Possibly as good a means as any in producing results would be record free associations that may occur to an open mind.

The first thought is that one must dispel the all too prevalent misapprehension that a Ministry of Pensions' Hospital houses incurables only. All hospital activities are carried on from the initial X-ray of an out-patient to the admission and treatment of the surgical emergency, as well as the attempts to lighten the burden of the case of prolonged illness. Diagnoses range between epidermophytosis and cysticercus epilepsy: incidentally, one has seen both of these in this hospital! Possibly a unique feature in our work is the opportunity of studying the patient's history *in extenso*: the attestation form, the

A.F.B178 (with all too frequent "blank duplicate"), the A.F.B1318, possibly blood-stained, the I.1220, the A.F.B179, and then all the medical board examinations. How differently the surgeon might have regarded the case in the beginning had he been able to see it in this retrospect! Nevertheless how justified he was in his action at the time, having before him the data he had, and being unable to assess the imponderable. In the attempt to improve the final result, there comes a moral lesson for the young officer, and for all of us at all ages—that our policy should be to effect some constructive improvement, and to help the patient and not to do something clever—"an operation that is feasible is not of necessity reasonable." From the medical aspect one can look back on cases one has known and ask oneself questions to which the answers can be but debatable. Why does the man with an old gun shot wound of 1918, with persistent discharging sinuses ever since, not get amyloid disease? He certainly has chronic suppuration and according to the textbook should be in danger of it. I have not seen one following bone sepsis. Is it because the blood supply to the injured bone is so poor that he does not absorb toxic products? And in such cases how impossible it is to do anything to a tissue now resembling ivory, with only its sparse blood supply to carry any parenteral medication to it! Possibly, it is this same lack of blood which allows the odd *Staphylococcus* to find a wayside shelter undisturbed by the scavenging phagocyte and so cause the apparently inexplicable "flare." How inexplicable they are. Yesterday, a man with a gun shot wound of the arm sustained in 1917 was discharged with complete healing following an acute "flare," his first. The standard advice one should give any man with bone damage is to seek advice when it troubles him, and to forget it until it does, as it may never do so. The same advice is equally accurate for the man with a retained foreign body. One would suggest that such, without suppuration or pressure symptoms, rarely gives trouble until the carrier knows of its presence. On the contrary, one has known of men carrying an appreciable amount of metal for many years without incident.

Regarding advice to patients, one sometimes wonders how far they are really deceived by euphemism in diagnostic terms. When the patient, going downhill, and the medical officer chat cheerfully about the future, is the patient not perhaps entering into this game of make believe? One recalls a case of carcinoma of the lung losing ground rapidly but apparently being perfectly happy and unrealizing. He was always looking forward to the time when the "abscess would burst." Half an hour before he died he remarked to the matron "Remember, I laughed to the end!"

Moreover, how far can physical condition be influenced by will-power? Does the will to live or die operate upon the body? Many one has seen have put up a grand fight against a failing body, and then renounced the struggle and "turned their faces to the wall." A cardiac patient is recalled living at the end of his myocardial strength for months. One morning he announced to a medical officer that he was tired of all this, and intended to let himself die.

He passed away peacefully eight hours later; his myocardium apparently was neither better nor worse than before, but die he most certainly did.

As is to be expected, amputation cases are numerous. It has been said that the amputee always suffers from a psychological awareness of being incomplete. This is agreed in some cases but not in all, as some definitely regard their loss with complete stoicism, common sense and apparently perfect adjustment. One suggests that apart from this ideal, amputees fall into two categories. One type lapses into depression and decides he wishes to seek sympathy: "Remember my wooden leg, you chaps." "If only I had two sound legs like you, old man"—types one knows among one's personal friends. The other type decides he intends using his artificial leg to the utmost and to show how clever he can be on it. In fact, he intends to show what can be done with such an appliance by a superman. This is the attitude undoubtedly to be encouraged in reasonable moderation, but scientifically are they not both manifestations of the awareness of a loss, one by emphasis, the other by over-compensation?

For really successful results an amputee must not only be given a suitable artificial leg, he must be taught how to use it to the best purpose. The trainer himself may, with great advantage, be an amputee. A good limb wearer may walk with a little limp or literally none, and there is nothing more convincing to a pupil than to have his remark "It is all very well for you chum, you have two legs" answered by the instructor mutely turning up his trouser leg! Two incidents illustrating at first hand the efficiency of the artificial limb may be given. One worked personally at the same table as an amputee and only realized the fact after four days when he calmly adjusted his sock by the simple expedient of inserting a drawing pin into his shin.

At the time of this association, a patient was seen with a high thigh amputation attending for replacement of his limb. He was a very active man and not only demanded it should be of peg-leg type but also it should have at least a six inch diameter circular base. He explained that the reason for the latter unusual request was that the "Greens Committee" would not allow him on the course otherwise, as he sank in on wet days. His handicap was eight.

Thoughts of amputees lead on to the very topical question of rehabilitation, a word of great portent, and perhaps misused. In ordinary hospital practice one cannot hope to send a patient out fully prepared to take on a skilled job of new type. Craft training cannot be carried out in a general hospital to this degree of perfection. Nevertheless, the preliminary foundations may be laid in the use of occupational therapy. For this and other reasons, "*no patient should do nothing.*" On admission a bed patient is encouraged to follow any constructive pastime, such as making table mats, embroidery, or scarves, and the quality of the resultant article is immaterial. What is important is that the man has learned, whatever his previous occupation may have been, that his fingers can be trained to be nimble. When he is up, he progresses to rug making, carpentry or whatever his ability or inclination may suggest. This

policy fulfils two useful functions. Firstly, it teaches a patient that he *can* learn a manual job even if dexterity be required. Secondly, it occupies his mind. There is no worse hospital influence both on the patient, and for the hospital, than a man of long-term stay doing nothing. A man discharged from hospital after a period during which he has vegetated, may be fearsome of a world where he has to use initiative and stand alone. Besides this, during his stay he is bored and may be recalcitrant, particularly if not having active treatment. If he can be taught that he is capable of learning a new job, if need be, and that such training as is proper will be available when he leaves, he has a different outlook on his future and his present. If such were the end of rehabilitation all would be well, or at any rate better than it is. But there are many other factors in the situation, those of industry, of housing, of travel, that make rehabilitation and welfare an involved task. Rehabilitation is not complete until a disabled man is not only trained but also housed and placed in employment. It is to the latter that the entire process is directed, and training without it is only frustration carried further.

Invariably, in talking of "the Old Soldier," one is asked how one finds him in discipline, and how does one organize it. Such can be summarized in a few words applicable to past, present and future soldiers: that a man should be taught of his badge, be it that of a County Regiment or be it a bright blue uniform . . . "never to disgrace it, for you may rest assured it will never disgrace you." Do not let "the Old Soldier" down, and he won't let you down—in fact, the opposite!

It is desired gratefully to acknowledge indebtedness to Colonel F. T. Rees, *C.B.E., M.C., T.D.*, Director-General, Medical Services, Ministry of Pensions, for permission to publish this article.

RECRUITMENT OF OFFICERS IN THE UNITED STATES ARMY MEDICAL DEPARTMENT

BY

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WHEN the war ended in 1946 recruitment for regular medical and dental commissions in the United States Army Medical Department was at a low ebb. The outlook indeed was critical for the Medical Department had heavy long-term post-war commitments. Doctors and dentists, with and without army war service, seemed to have little interest in the regular army as a career. Those who had served in the war had had enough, the excitement was over, they wanted to get back to their families and their civilian jobs. They remembered the separation, often lengthy, from their families, the frequent moves, the many irksome non-professional tasks, and the "red tape." What could the peacetime regular army offer them anyway in comparison with a civilian career? They felt army service lacked the independence of civilian practice, that the pay was inadequate and that professional opportunity was limited. Those who had not seen war service thought the same way and even regular officers were being tempted by the lure of lucrative and settled civilian practice. Peacetime army service was looked upon as a priesthood in which a wife and family constituted a disadvantage owing to the shortage of housing in overseas stations. It would seem as if even the glamour of army uniform, now too drab, and the opportunity of a good time, now too expensive, had ceased to be attractive while the description of army service being "a good life" rang rather hollow.

Realizing it had to compete with the civilian market for doctors and to hold what officers it had, the Army Medical Department, with the co-operation of the General Staff, government agencies and the civilian medical profession, examined the reasons and sought remedial measures for the unattractiveness of a regular army medical career. The immediate necessity was economy in the use of the professional men: medical and dental officers were relieved of time-consuming non-professional duties by the use of carefully selected and trained Medical Service Corps (non-medical) officers. Medical work was assisted by the provision of clerical staff and the modernization of office equipment. Administrative procedures were simplified to save time. The resultant professional output by fewer doctors increased and improved. Pay has improved and an extra thirty-five pounds per month given to medical and dental officers, while priority in housing at overseas stations has been given to medical and dental officers with families.

The most powerful inducements, however, to regular army medical and dental recruitment were the introduction of the Graduate Professional Training Programme and the Career Guidance Plan. The former provided for one-year Army internships at Army and civilian hospitals (with an obligation of one year's subsequent general duty), and offered residency training (registrarships) in the specialties to those who took regular commissions. The Career Guidance Plan made it possible for a regular officer in any corps of the Army Medical Department to be given a chart outlining to him what he could achieve in his army career by his military proficiency and professional attainments. This system assures the officer that he is being considered as an individual and that his employment will be based on the premeditated career plan in which he himself has been consulted.

The profession and the public had to be told of these post-war improvements in order to dispel the prejudices and misconceptions which existed about regular army medical service and to foster interest in it as a career. This was effected by means of an extensive information programme in which full support was given by the medical and lay Press. In addition the Surgeon General's Personnel Division has been sharing its problems with Medical Department officers by means of articles on personnel matters in the monthly "Armed Services Medical Bulletin." Participation by leading and able regular officers in the meetings of national, state and local medical societies has also done much to present the Army in a favourable light. The fruits of all these well-planned and executed efforts are now appearing: an increasing number of fine young doctors and dentists in the United States are finding that the Army offers an attractive medical career with plenty of incentive, and older regular officers are finding a professional stimulus in the new order.

The following article deals with the important subject of career management in the United States Army and in its Medical Department. Colonel Fielding, who is joint author of the article, is one of several in the Surgeon General's Personnel Division who has been specially groomed for personnel administration. After completing his medical training at the University of Southern California from which he graduated M.D. in 1937, he joined the United States Army Medical Corps, and served a year's internship at the Army's Letterman General Hospital, San Francisco. He was appointed to the Personnel Division of the Surgeon General's Office in 1943 and was sent in 1946 to the University of Maryland for an intensive course in personnel administration. In the following year he studied the practical aspect of this subject in three well-known American industrial concerns, Schenley's Distilleries, General Foods Corporation and E. R. Squibb and Sons. With this training, and with his experience in personnel matters, Colonel Fielding is able, with Colonel Robinson, to give us a concise picture of career management in the various corps forming the United States Army Medical Department.

CAREER MANAGEMENT IN THE UNITED STATES ARMY MEDICAL DEPARTMENT

BY

By FRED J. FIELDING, M.C.

Chief Management Branch, Personnel Division,

AND

Colonel PAUL I. ROBINSON, M.C.,

Chief, Personnel Division Office of The Surgeon General

INTRODUCTION

PERSONNEL practices which have been empirically followed for years are often renamed and represented in a surprise introduction as new. Rather than being condemned, this practice should be applauded for its utility. A function that is but vaguely defined lacks organizational clarity and may operate without that general awareness which assures full acceptance and use. When the considered pursuit of an effort is operative its full impact is likely to be felt in the field of application.

Career Management, as it is practised in the Surgeon General's Office, United States Army, illustrates this view. It can be shown that Career Management and guidance were practised in training and assigning officers long before this personnel administration principle was defined in exact wording.

Ashburn's history of the Army Medical Department states that "In 1877, Captain A. C. Girard, Assistant Surgeon, after a trip to Europe, came back thoroughly convinced of the value of Lister's Antiseptic Method—he sent to the Surgeon General a full description of the technic and results."¹ As early as 1862 an Army Medical school for the instruction of "Medical Cadets" was recommended by the Surgeon General. This recommendation was finally followed by authorizing legislation in 1893. Of a distinctly Career Management nature, however, is a letter from The Surgeon General to a hospital commander

¹ Ashburn, P.M., *A History of the Medical Department of the United States Army*, Boston and New York, Houghton, Mifflin Co., 1929, p. 135.

concerning the assignment of an officer to a new duty. This letter was found in the subject officer's file:

January 13, 1919.

FROM: The Surgeon General of the Army.

TO: The Commanding Officer,
U.S. Army General Hospital No. 3,
Colonia, New Jersey.

SUBJECT: Assignments.

1. Some weeks ago the Department arranged to send a number of medical officers, regular army, to the Mayo Clinic for a course of instruction. These officers are now being assigned to General Hospitals for duty with the object of giving them an opportunity to continue their surgical instruction and to improve themselves in surgical technique.

2. No consideration of expediency should be allowed to interfere with this object and such regular officers should not be given administrative duty. Neither should they be permitted to displace the present Chiefs of Surgical Service at the various hospitals even though they hold a higher grade in the Medical Department than the officers now serving as such.

3. Lieut.-Colonel Charles L. Gandy is the officer who has been selected for assignment to U.S. Army General Hospital No. 3, Colonia, New Jersey.

By direction of the Surgeon General:

R. B. MILLER,

Colonel, Medical Corps, U.S.A.

A study of the careers of retired Army Medical Department Officers, now holding positions of prominence in the Medical world, shows that many were carefully patterned. This patterning was accomplished before career guidance for Medical Department Officers became the function of a Career Management Branch and before the practice had been crystallized in a Department of the Army publication.

The symbolization of personnel department aims creates an impulse toward more general adoption. Effective personnel administration cannot reside in the policy expression of high level bureau or in the thinking of a department head. To be effective its spirit must permeate all ramifications of a supervisory structure.

The pivotal Branch of the Personnel Division, the Career Management Branch, is set up to assure these enlightened personnel practices at all supervisory levels. In its organization and total functioning mechanisms have been developed which tie supervisory levels together in a composite recognition of applicable career patterns. Serious changes in policy arising out of a variable interpretation at the several levels of management are less likely to occur under such organization.

THE CAREER MANAGEMENT FUNCTION

The guiding conception of career patterning for all military personnel was developed by the Army General Staff with a group of units representing the several arms and services operated centrally to control training and duty assignments patterned in relation to demonstrated ability.

Under this central function overall plans were developed to be applied to officers of all arms and services. The military career was visualized as falling into four periods: Junior Officer Period, Command and Staff Period, Field Grade Phase and a Final Career Management Period.

The Junior Officer Period encompasses the first seven years of Army service. During these years the young officer is afforded an opportunity to develop leadership and Army know-how. He learns to gauge the physical and mental qualities of the soldier and learns the psychology of human relations and wise management. He finishes during this period, the basic and advanced courses of his branch and may attend applicable courses in civilian institutions. He is rotated in the various troop command and staff assignments and gains a well-rounded experience and seasoning.

The Command and Staff Phase covers the second seven years of the officer's career. During this period he is given command assignments, duty with Reserve units in training and staff or technical duty. At this time he evolves the specific area of his interest. He may attend the Command and General Staff College, the Armed Forces Staff College or university courses which contribute to his field of major interest.

The Field Grade Phase of his career is that between the fifteenth and twenty-first years of service. Here his career assumes clear definition and his assignments are to more responsible positions. He may complete the top level military schools, such as the Industrial College of the Armed Forces and the National War College or he may accomplish other studies at university level. This group of officers have established themselves as possessing outstanding ability and are given assignments in which their maturity and experience is utilized and their prestige is in keeping with their grade.

The Final Career Management Period involves that especially effective group who have had outstanding records in the preliminary career phases and are prepared for high level leadership posts under conditions of either peace or war. This group is afforded opportunity for testing and training in the all-important qualifications of troop command and high level staff work and a final opportunity is open to them to check their knowledge of the possibilities of Army material.

To recapitulate, the Army utilizes a group of Military specialty schools to provide training to its officers. It uses civilian schools and universities in accomplishing officer training in fields not covered by military training installations. If the officer demonstrates ability he may look forward to a patterned career in which assignments and training opportunities follow his interest and help him to achieve that breadth and competence necessary to significant accomplishment in the service of his country.

CAREER PATTERNS

In pursuit of the aims set by this development, a career pattern has been worked out and is outlined schematically for each of the arms and services.

10 *Career Management in the United States Army Medical Department*

The planning of these patterns utilizes the Service schools peculiar to the arm or Service as well as those schools mentioned in the section above. These latter are open to the qualified officer regardless of arm or service.

In this way career guidance through the phases outlined above is supplemented by training in Service schools which offer basic, intermediate and advanced work in the military subdivisions of Infantry, Artillery, Medical, etc. Each Service has developed its own schools with well-established age and tenure stipulations for course eligibility. Career Management is aimed at assuring at all levels of supervision a cognizance of this ordered and progressive military career. Commanders are responsible for appropriate assignment and training progression.

The principles outlined here have been applied to the development of career patterns for Enlisted grades and Warrant Officers as well as for commissioned personnel. The discussion here is limited to commissioned officer career guidance.

MEDICAL DEPARTMENT CAREER PATTERNS

A detailed career pattern has been devised for each Corps within the Medical Department. The Corps represented are: Medical, Dental, Veterinary, Nurses, Medical Service and Women's Medical Specialists.

Medical Corps.—The pattern for the Medical Corps recognizes three functional types of physicians in the Army service: the Staff Officer, the Medical Command and Management Officer and the Professional Specialist.

All medical officers enter the service as First Lieutenants. Four years of medical school work is credited for rank purposes. During the first three years of Army service officers serve in field medical units, hospitals, and in dispensaries—located either at home or overseas. In these years they completed the basic Medical Field Service School course and may compete for residency training in Army General hospitals. Basic science courses at Universities or at the Army Medical Department Research and Graduate School are available.

The second three years will see the progression through the residency and practice years leading to Board certification for the specialist group. Officers will attend the advanced course in the Medical Field Service School during this or the following period.

The career beyond the sixth year of service phases into the period of specialization. Here Board certification is completed by the specialist. An officer in the Staff group may attend a university course in Public Health or in Personnel Administration, or serve as instructor in a Service school or with a Reserve unit. The Command Officer may take university work in hospital or business administration. The Command and Staff group start on their attendance to the successively higher levels of the Army General Service Schools.

Appropriate assignment is interlarded with these training years. For the professional specialist the assignment is that of assistant chief of service in a general hospital, or chief in a smaller hospital. For the Medical Command

and Management officer assignment as an Executive Officer or Commanding Officer of a supply or hospital installation brings him to the assumption of increasing levels of responsibility.

The Staff Officer will serve as Group or Division Surgeon, on an Army Surgeon's staff, or as a Service school department head.

From the seventeenth year of service to retirement, the officer serves the definitive period of his career where he is afforded the opportunity to demonstrate his eligibility for positions of highest responsibility within the Medical Department of the Army. He will here serve as Army, Command or Theatre Surgeon, command a general hospital or other major medical installation or activity, or serve as a consultant or chief of Professional service in his specialty field, the particular assignment depending on his previous career direction.

Dental Corps.—The Dental Corps officer career pattern approximates that of the medical officer. In addition to the specialty fields of Oral Surgery, Prosthodontia, Peridontia and Orthodontia there are career fields in Research and Development and as a Staff officer. The dental officer receives a constructive credit of three years for his work in dental school and enters the Service as a First Lieutenant. He may attend the same Army General Service Schools and the Medical Branch Schools open to the medical officer.

Veterinary Corps.—In addition to administrative and staff assignments the Veterinary officer career may be patterned as Meat Food Inspector, Dairy and Poultry Products Inspector, Laboratory officer or in the Animal Service. Two years of constructive service is credited the veterinary officer for professional education previous to commissioning. He may progress through the Army General Service Schools and attend the branch schools. He may take advanced specialized training at a civilian university or Research Foundation.

Medical Service Corps.—This Corps includes officers specially trained in the allied medical fields. The Corps has given the Medical Department the use of officers for duties once included in the work of the medical officer and the development of such a group has been most valuable in enabling a clear definition of what is Medical and what is allied to Medicine. The division of duties thus accomplished has done much to establish professional patterns in both Medical and Medical Service Corps which are logically delimited and professionally satisfying.

The Medical Service Corps includes in its four sub-fields approximately twenty well defined and separate career areas. Under Pharmacy, Supply and Administration are grouped qualified pharmacists, and business and administrative personnel of a very diverse nature. The Sanitary Engineering section is reserved for university graduates qualified in this field. The Optometry section contains the officers who are graduates of a four-year optometry course and certified for practice in one of the forty-eight States. The Allied Science section includes officers who hold university degrees and whose experience qualifies them in the fields of Bacteriology, Serology, Biochemistry, Entomology

and Nutrition. Others are qualified as Psychiatric Social Workers and Clinical Psychologists.

Officers of this Corps rotate through the Army General Service Schools and may hold assignments in Staff and Command positions or as instructors in Service Schools or with Reserve units.

Nurse Corps.—The Nurse Corps officer may follow a career patterned in a professional or administrative way and schools, both military and civilian, are utilized to provide specialized training in the direction of interest and ability.

Women's Medical Specialist Corps.—This Corps commissions Dietitians, Physical Therapists and Occupational Therapist Technicians. The same opportunities for career development are offered here as in the other Corps of the Medical Department.

SCHOOLS USED IN MEDICAL CAREER PLANNING

Career guidance in the Army Medical Department has evolved slowly and in the process taken unto its use the facilities of certain teaching institutions. The Medical Field Service School is basic to this educational hierarchy. At the outset of an officer's career he spends six to nine months at this school and studies the organization and function of field and stationary medical installations. He learns the special problems of field sanitation, military hygiene and the care and rehabilitation of the sick and injured.

An advance course in similar subjects is given during his third to ninth year of service.

The Army Medical Department Research and Graduate School located at the Army Medical Center, Washington, D.C., provides basic science training in various specialty programmes and is an accessory to the residency training programme. Residencies in all the specialties are given in Army General Hospitals to career medical officers entering the professional specialist group.

Army General Service Schools provide concurrent training in the purely Army aspect of the officer's career. They are:

The Command and Staff College provides instruction in modern methods applied to Personnel, Intelligence, Tactics and Logistics. Methods calculated to effect full utilization and co-ordination of Armed Forces units are taught.

The Armed Forces Staff College trains selected officers of the several Services in joint operations, the material of such operations and the staff technique employed.

Industrial College of the Armed Forces trains officers in procurement planning, procurement and mobilization of the national economy. International economics is studied and methods of achieving rapport with educational, scientific and industrial groups emphasized.

The National War College prepares selected officers to perform joint staff duties in the highest echelons of the Armed Forces.

The extent to which university facilities are utilized is indicated by this

partial list of courses given in twenty colleges and universities and open to Medical Department officers during the current year.

Courses open to Medical Corps officers include those in Allergy, Anæsthesia, Aviation Physiology, Cardiology, Children's Orthopædics, Dermatology, Internal Medicine, Orthopædic Surgery, Personnel Administration, Hospital Administration, Public Health, Radiology. Courses are usually either a school year or a calendar year in length.

Open to Dental Corps officers are Anæsthesia, Oral Surgery, Peridontia.

To Veterinary Corps officers courses are offered in Bacteriology and Virology.

Open to Medical Service Corps officers are studies in Physical Reconditioning, Bacteriology and Virology, Entomology, Business Administration, Parasitology.

For the Army Nurse Corps officers courses are offered in Nursing Education, and in Psychiatric Nursing.

Courses for the Women's Medical Specialist Corps include Physical Therapy in Infantile Paralysis, Institutional Management, Nutrition and Occupational Therapy in Psychiatry.

SUMMARY

(1) Projected estimates of scientific talent needed by the Medical Department United States Army provide indices for formulating officer training plans.

(2) School and duty training opportunities consistent with these estimates are established into which selected officers are channelled.

(3) A clearly defined Career Management function operates to impose career guidance responsibility at all levels of supervision and leads to the patterning of an officer's career in the direction of his interest and demonstrated ability.

MEDICAL ARRANGEMENTS IN MALAYA DURING THE EMERGENCY 1948 - 49¹

BY

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Late Royal Army Medical Corps

I BEGIN my lecture by giving a very brief description of Malaya and its inhabitants. The Malayan Peninsula extends from the Siamese border in the north to the island of Singapore in the south. Malaya is a little larger than England without Wales. Four-fifths of the country is covered in evergreen jungle.

The remaining one-fifth is occupied by plantations, tin mines, towns and villages. It is divided down the centre by parallel ranges of mountains which vary from 2,000 to 7,000 ft. in height. The East Coast is very attractive with great stretches of white sandy beaches and rocky headlands and covered at intervals by beautiful casuarina trees. The West Coast is largely muddy flats with mangrove swamp the haunt of mosquitoes and every biting insect. Inland on the West Coast there is a preponderance of Chinese attracted there by the tin deposits and the land suitable for growing rubber. The East Coast is largely inhabited by Malaysians except in the sparsely scattered towns.

The West Coast is served by excellent roads including a first-class road running the whole length of the peninsula. The Railway on the West Coast is considered second to none in the Far East and is rapidly regaining its pre-war standard with first-class air-conditioned coaches and restaurant cars attached to all the express trains.

The Inhabitants.—The population of Malaya is roughly about 5½ millions, made up of Malays and Chinese in about equal number, but includes 30,000 Europeans (excluding the Army), 750,000 Indians, 20,000 Eurasians and also about 30,000 Aborigines generally known as Sakai, who inhabit the jungle and rarely emerge from it.

The Malays are a very attractive, humorous and peace-loving people, possibly somewhat indolent judging from European standards. Their main occupations are farming and fishing. They have their own Sultan in each State to whom they are extremely loyal. They have occupied Malaya for 5,000 years and are friendly to all foreigners, having no sense of inferiority.

The Chinese are a cheerful and exceedingly hard-working people, great shop-keepers, and in many ways the backbone of the business community. They are mostly Buddhists or followers of Confucianism.

The Indians are mostly migrants from the Madras district and South India.

¹A lecture delivered at the R.A.M.C. College on March 9, 1950.

The greater number are employed as labourers on the estates, but there is a small but powerful minority from Ceylon. They are good administrators and are highly influential.

The Eurasians are well established in Malaya and play an important part in the life of the country. They are mostly descended from the Portuguese and the Dutch.

Sakai.—This aboriginal race is physically well developed, small in stature, but well proportioned; very shy but friendly. They live entirely in the jungle and carry blow pipes which they use with great skill in procuring food.

INDUSTRY

Rubber and tin are the two main industries. Rubber was introduced to Malaya from Brazil. The seedlings were germinated at the Royal Botanical Gardens at Kew. In 1897 there were only 345 acres of rubber in Malaya and now there are more than 3 million acres planted with rubber trees.

CLIMATE

The temperature is humid, rarely above 90° with a 10 to 20° drop at night. The country is famous for its variety of flowering trees and shrubs. Garden flowers are difficult to grow but well repay the time and trouble spent on them.

PRE-EMERGENCY PICTURE

It was well known that trouble was brewing. Planters and miners were aware that their lives were in danger and protection was asked for before any serious outbreaks of lawlessness actually occurred. Almost continuous strikes on the plantations and at the mines often for apparently frivolous causes were omens pointing to further trouble. But to the tourist travelling through Malaya the general picture was one of peaceful tranquillity. At that time if you happened to be touring Malaya by car the pleasure of driving through the small villages in the evening was a very real one. As the sun was setting you could see the villagers sitting at the doorstep of their picturesque houses, chatting and gossiping and ready to wave a friendly greeting to you as you passed by or, if you broke down on the road, always ready to give what assistance lay in their power. The war appeared at last to be over under these conditions and the scars rapidly disappearing. Bridges had been rebuilt, wrecked cars and old broken-down tanks had either been removed or overgrown with lallang (the local grass). Certainly it looked a smiling countryside with prosperity apparently round the corner for all classes of the community. Supplies of rice were improving monthly. Wages of labourers were higher than they ever had been in the history of Malaya and yet all this peaceful scene underwent a startling and rapid change almost overnight as the Communist bandits struck with cold-blooded murder and wholesale destruction of property in a bold attempt to paralyse the industry of Malaya and to seize the country for Communist purposes.

THE EMERGENCY

The outbreak of banditry was well organized. In May 1948 serious attacks on life and property were carried out simultaneously in many parts of the country. Planters and tin miners were taken out of their bungalows and shot in cold blood by well-armed and disciplined bandits, many wearing uniform and in military formation. Their methods were simple enough. Having first held up the labour gangs on the estate and confined them to their quarters, they walked up to the manager's bungalow, fully armed, and arrested the unarmed manager and assistant manager. They took them out, tied them to trees and shot them. Having carried out their execution they departed to their organized camps in the jungle. When messages got through from the estates, police and soldiers coming to the rescue were themselves ambushed by groups of bandits.

This state of affairs produced the emergency which was officially declared in June 1948. One of the first results of the emergency was an immediate demand for arms and armed protection from estates, mines and many other business concerns throughout the country. Needless to say, all demands could not immediately be met, but all available arms were distributed and places considered of vital importance were supplied with military or police armed guards.

At H.Q. Malaya District we were immediately plunged into a series of conferences. Each branch of the service was requested to state its requirements to deal with the situation under two headings, one was immediate requirements with troops at their present strength and engaged under active service conditions in the jungle. It was realized that the bandits would have to be engaged on their own ground in their hidden jungle camp. The second heading was future requirements, the estimated strength being given as an extra brigade with auxiliary troops.

The first request by the A.D.M.S. Dist. was—"Can you give me a rough estimate of casualties to be expected in the next few months?" but no one was prepared to give a firm figure. I concluded my own estimate was probably as good as any one else's. I have many times requested an estimation of casualties but seldom received a clear-cut answer. The only time I can personally remember a Commander giving a definite estimation was when listening to Lord Montgomery's final speech before Alamein, he stated that he was prepared to accept 50 per cent casualties. He repeated this twice to make quite sure everyone understood it. I think we all felt sorry for our next door neighbour on that occasion.

DIVISION OF CONTROL

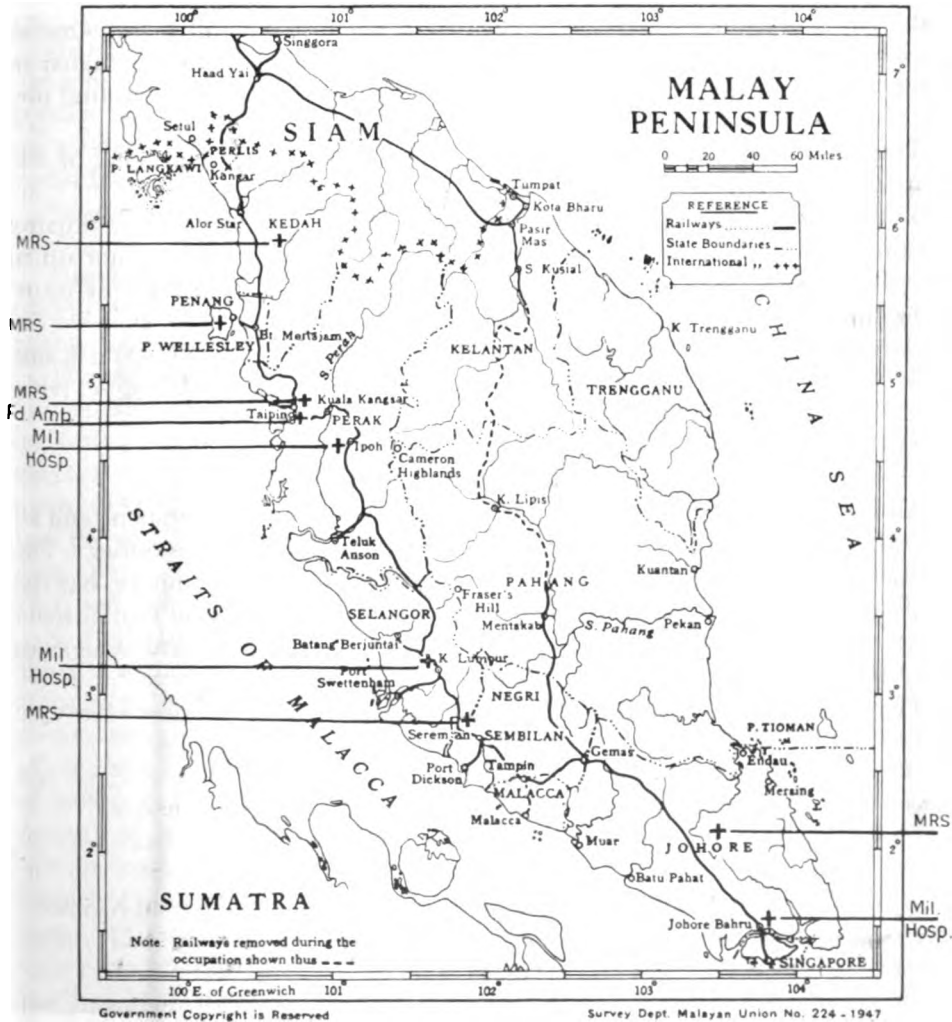
Malaya Dist. was subdivided into 3 sub-districts each commanded by a Brigadier—North Malaya Sub-District with H.Q. at Taiping; Central Malaya Sub-District with H.Q. at Serembam and Johore Sub-District with H.Q. at Johore. North Malaya Sub-Dist. and Johore Sub-Dist. each held an A.D.M.S. appointment while Central Sub-Dist. had a D.A.D.M.S. on the staff. The A.D.M.S. at Dist. H.Q. at Kuala Lumpur was myself.

Before estimating our immediate requirements it was necessary to review our

medical resources. There were four military hospitals in the district, one being a convalescent hospital in the Cameron Highlands. All these hospitals were in commandeered buildings and the civil medical authorities were busily using every legitimate effort to take them over, as they were short of accommodation. The largest of our military hospitals was in a portion of the Civil General Hospital at Kuala Lumpur. We had already returned our administrative building as well as several wards and this left us with no possible room for expansion in the hospital itself but there was room for tentage between the wards if necessary. This hospital was equipped for 300 beds.

The second hospital was situated in Johore, again part of the Civil General Hospital but this was a modern hospital in spacious grounds well equipped and with room for expansion. It was equipped for 200 beds.

The third hospital was in Ipoh—an unsatisfactory building for a Military



Hospital; it had previously been a Chinese Maternity Hospital. There was no possibility of expansion here except in tents in the rather inadequate grounds. This hospital was equipped for 200 beds.

The fourth hospital was a convalescent hospital situated in the Cameron Highlands. This building was previously a Convent School and the nuns were naturally very anxious to regain it for their own use. This building was capable of expansion, but the approach to the hospital was difficult and liable to be cut off if operations increased in intensity in this area. It was equipped for 100 beds.

Besides these four hospitals there were five medical reception stations. From North to South as follows: At *Sungei Patani* a very good one just completed, accommodation 30 beds. One at Penang in a good building—part of the original barrack scheme for Clugor barracks. Accommodation 20 beds. Capable of expansion to 40 beds. One at *Taiping (Kamunting)*. This was in hutted accommodation; accommodation 20 beds capable of expansion to 40 beds. One at *Serembam*, 30 beds expanding if necessary to 40. This M.R.S. was situated in an old masonic lodge building which was urgently required for its original use. One at *Kluang* in huts capable of expansion from 20 to 40 beds.

These four hospitals and five medical reception stations give a figure of 700 equipped beds without expansion.

There was one Field Ambulance in the District at the time. It was situated at Taiping in an old convent building. This Field Ambulance was not up to strength in officers, O.R.'s or vehicles and it was not due to be brought up to strength until 1949.

Our other resources included a Field Hygiene Section with its H.Q. at Kuala Lumpur, and a small but complete ambulance train capable of taking 40 lying cases.

MEDICAL EQUIPMENT

All four hospitals held three months' reserves of medical equipment and all were in a measurably good position to deal with an influx of casualties. The five medical reception stations held a small reserve of medical supplies, but the buildings which they occupied were not suitable for anything but first-aid surgery and the medical officers in charge had had no special surgical experience or training.

This was roughly the picture one had in mind when considering what were the essential medical requirements to meet the emergency situation.

Having carefully considered our available resources in personnel and material our requirements fell under these two headings.

PERSONNEL

Medical Officers.—All hospitals were reasonably well staffed but all regiments were not supplied with medical officers. The Gurkha Regiments had arrived without medical officers and medical officers had to be found for them. Therefore an increase in the number of medical officers for duty with regiments was

requested. The aim was to give a medical officer to every regiment actually engaged in operations.

The second request was to have the Field Ambulance brought up to strength as rapidly as possible so that after intensive training they could be detailed to take part in active operations. This was to prevent continuous demands being made on the hospitals for personnel for active operations.

Thirdly, the establishment of a surgical team available at short notice for working with the Field Ambulance or as a separate unit attached to a civil hospital without adequate surgical facilities to deal with a rush of casualties.

Fourthly, to have the ambulance train increased in size. Two carriages belonging to the ambulance train were at that time out of use and required a complete overhaul; the staff of the ambulance train to be increased proportionately.

EQUIPMENT

Increase of stretcher and blanket dumps at all hospitals and M.R.S.s. It was considered that the railway line and roads might be blocked for considerable periods and that as a result the demands on air supply would be very heavy; the air priority would be operational except for the evacuation of life and death casualties.

Secondly, the supply of medical mobilization equipment to regiments who were not in possession.

Another immediate problem at this time was to ensure that all medical officers acting as R.M.O.s had an immediate refresher course in first-aid surgery at the earliest possible moment.

Having made these major requests amongst many others it is interesting to look back and see how they were met. First let us consider the request for increasing the number of medical officers to act as R.M.O.s. We required another six as rapidly as possible. The reply came back from Medical Directorate H.Q., F.A.R.E.L.F. "None available at the moment but we will do our best for you." Within three days 3 M.O.s had reported to my H.Q. and a few days afterwards another 3. Medical Directorate F.A.R.E.L.F. and Singapore Dist. had stripped themselves to supply us.

I would like to consider now what goes to the making of a good R.M.O. What is required normally is the physically strong well-built cheerful type who is ready to take the rough with the smooth. A good mixer and if possible a medical officer who is really keen on going to a regiment. This type of medical officer must be sent to a good regiment. It is a great mistake to send this type of medical officer to a regiment which does not take a real interest in their doctor and in medical problems connected with the regiment. The result is that the best regiments almost always get the best R.M.O.s. But surprises are frequent in dealing with medical officers. I have sent more than one apparently unsuitable medical officer to a good regiment because they happened to be the only one available and they have turned out howling successes. In other words, it is well to remember when posting individuals that one cannot always judge the book by the cover. This reminds me of one occasion in the desert when

holding the appointment of A.D.M.S. 10th Armoured Division, I was tackled by an O.C. Regiment immediately after a minor engagement which had lasted for three or four days. He came to Divisional H.Q. especially to see me. Could I change his medical officer as he was not quite the type the regiment required. When the show started he disappeared into the battle and was said actually to have taken part in the show with rifle and hand grenades. In fact he was much too warlike. The O.C. went to some length to explain what he wanted and that was a medical officer who would look after his men in the welfare sense. He said he required someone more like a padre and of a really sympathetic nature. I said I quite realized the type of M.O. he required and that I would be visiting the regiment the next day and would interview the medical officer but it was most unlikely that I would be able to change him. However, about half an hour later another O.C. regiment called in and after some conversation about medical supplies and the show that was just finished he came to the point of his visit. Could I possibly change his M.O.? If I could give him someone who would always be up with the men in action it would help the morale of the regiment greatly. His present medical officer was a very pleasant fellow but more of a padre than an M.O. really not the type for a fighting battalion. I told him I might be able to do something about it and having interviewed both medical officers I found they were both delighted with the idea of a change of regiment. The happy sequel to this true story is that in due course our M.O. the padre type won the *M.C.* and the other one was mentioned in dispatches. Postings do not always work out as easily as that but it helps to illustrate that a medical officer posted to a good regiment who is prepared to take a real interest in the regiment he is attached to soon settles down and ends by being exceedingly sorry to leave the regiment when the time comes for him to return to hospital or other duties.

Another quite recent picture comes to my mind of a R.M.O. who had been posted to a Gurkha regiment. A few days after posting the regiment received orders to undertake quite an extensive operation to clear bandits out of two villages which they had occupied. The medical officer came to see me before the operation very anxious and worried about it all. Could he have a hospital job when he came back as he considered he would be more suitably employed there. The operation lasted for about seven weeks and was quite a gruelling affair with strenuous jungle marches and a fair number of casualties. In due course the medical officer reported back almost unrecognizable from the extremely anxious medical officer who had departed seven weeks before. He was full of the show and what had been accomplished and how splendid the medical detachment had been. I said what about that hospital job but he said he would rather not have it at present as he had heard that the regiment would shortly be under orders for another show and they would require him.

NO. 1 FIELD AMBULANCE

The request to bring the Field Ambulance up to strength at an earlier date than was originally intended was granted and personnel both British and Asian

were posted and intensive training was begun. The request for full strength in vehicles took a considerable time due partly to the lack of skilled drivers available and the necessity for complete overhaul of vehicles which had been lying in car parks and depots for many months.

Sufficient officers and other ranks were soon trained and equipped with enough vehicles to send out a functioning A.D.S. when and where required. At this period great help was given to the Malay regiment by detaching sections to assist them on active operations. This was officially not our responsibility, but we were requested to give all assistance possible to the Malay regiment owing to their shortage of trained medical officers, medical other ranks and equipment.

SURGICAL TEAM

The establishment of a surgical team appeared to be a pretty obvious necessity at this time for use in forward areas. The request was immediately met in a very common-sense manner. The complete equipment was immediately sent up to the Military Hospital at Kuala Lumpur with instructions for the surgeon and anaesthetist at Kuala Lumpur to take the equipment out if the surgical team was required very urgently. Another surgeon and anaesthetist would be flown up from Singapore to replace those sent out. If time permitted the team would be sent up from Singapore and collect their equipment *en route* to their destination. This arrangement worked very smoothly when a surgical team was requested by A.D.M.S. North Malaya Sub-Dist. to work in conjunction with an A.D.S. of 1 Field Ambulance. The troops were operating in the extreme north of Malaya and it was considered that casualties might be heavy and the journey down was a long one before surgical facilities could be given. The surgical team established themselves in a small building in close proximity to the A.D.S. As it happened there were no serious battle casualties on this occasion. In spite of this, useful lessons were learnt and if heavy casualties had occurred their strategic position was a valuable one and it is reasonable to assume that lives would have been saved and that convalescence would have been more rapid after treatment within a short period of being wounded where they could be held in comfort for a considerable number of days after operation.

EQUIPMENT

The request for extra stretchers and blankets for each hospital and M.R.S. was met very rapidly. The Base Depot of Medical Stores had our supplies on the train within twenty-four hours. Complete mobilization equipment sets for regiments were checked, put together and sent up very rapidly. In fact all medical indents were met in a remarkably short period.

It can be seen from this brief outline that we were not "caught napping" when the emergency was proclaimed. In point of fact we were medically in a very sound position as regards hospitals and equipment, thanks largely to my predecessor at Kuala Lumpur and the insistence of our higher formation at Singapore on keeping up sufficient hospital beds in Malaya to cope with a situation such as had arisen.

SPECIALIZED EQUIPMENT

Demands for specialized equipment of all sorts soon began to pour into District H.Q. and the medical Branch began to receive its quota. The following items amongst others were discussed: The normal stretcher was much too heavy for jungle warfare, could lighter ones be supplied? Could we have an ambulance plane specially equipped to carry patients? A special group of jungle fighters was being formed. Could we supply a special medical pack for them?

Stretchers.—It was pretty obvious that the “stretchers universal” was too heavy for jungle work but there were very few airborne stretchers in the country, so an urgent request was made for them and they were in due course sent out from U.K. In the meanwhile we experimented with Neil Robertson stretchers and also with some emergency stretchers constructed with the assistance of R.E.M.E. They looked excellent. Strong green canvas with straps to prevent the patient slipping when going up and down hill and large slots for bamboo poles down each side of the canvas. As I said, they looked a simple and workmanlike job and several of them were immediately dispatched to No. 1 Field Ambulance for trial under jungle conditions. However, they did not fulfil their promise, possibly due to the stitching not being of sufficient quality and as reports of the immediate arrival of airborne stretchers came in, these emergency stretchers were not made in large numbers. The Neil Robertson stretcher used with a single bamboo pole was reasonably satisfactory as regards weight but too hot and uncomfortable for the patient on a long journey. The most satisfactory stretcher for use in the jungle is undoubtedly the Neil Robertson modified with four canvas loops. The patient is carried by four men each carrying a loop close to the body and as “air drops” are now a regular feature of jungle warfare the dropping of a modified Neil Robertson appears to provide the best answer instead of trying to struggle through the jungle with other forms of stretchers under very great difficulties.

AMBULANCE PLANES

An ambulance plane was asked for at an early stage in the emergency but this could not be supplied. Landing grounds for Dakotas and other heavy aircraft were being developed and air strips for Austers were rapidly increasing all over the country. If a specially equipped ambulance plane could not be provided, a specially built Auster to take one patient in comfort would have proved of great value. However we never got further than improvisation with Austers, using again the invaluable Neil Robertson stretcher. Fitted with two wooden boards to give support to the stretcher it gave the patient a reasonably comfortable ride in a somewhat cramped position.

I would like to stress here that although we had no ambulance aircraft allotted yet I cannot remember one single case of serious delay in evacuation of a patient by air once the request for air evacuation had been submitted to the right quarter. The sequence of events was somewhat like this. A telephone message to the A.D.M.S. Dist. Office. “Air lift required for patient.” It might be a wounded man who had just been carried out of the jungle or for a case

already in hospital which required immediate specialist treatment at Singapore. Air Command at Malaya Dist. was immediately informed explaining exactly what is required. The reply was often, "no plane available all operational but we will see what we can do will ring back." In about ten minutes a message is received saying that it is all fixed. By this you can realize that although we did not have a special ambulance plane yet our cases were and still are being evacuated by air when necessary and with great efficiency.

LIAISON WITH CIVIL MEDICAL SERVICE

Close liaison with the Civil Medical Service was even of greater importance now than under normal conditions. Difficulties had been experienced and were still being met with owing to our prolonged occupation of civil hospitals. This was largely due to continuous delay in obtaining permission to build on sites considered suitable for military hospitals. Protracted negotiations were undertaken to obtain the necessary building site for our hospital outside Kuala Lumpur. When the emergency was declared I found it necessary to request the use of all civil hospitals in Malaya for emergency casualties. A short conference soon cleared the air and offers of reciprocal help by ourselves for civilian casualties soon gave a picture of complete agreement. Cordial relations were established which stood the test of time. I consider that we owe a considerable debt of gratitude to the Civil Medical Service of Malaya for their unfailing assistance given to our casualties when they were admitted to civil hospitals.

FERRET GROUP

These specialized groups of jungle fighters were formed in the early days of the emergency and are now disbanded. They were used as a highly mobile and independent force. British civilians who had war experience with Force 136 or who had specialized knowledge of the jungle were asked to help form these groups. A number of outstanding men already holding civilian appointments immediately volunteered and selections made. Each group was commanded by an experienced civilian or a British officer with previous jungle experience. Their training was undertaken under very arduous conditions with prolonged jungle marches. Volunteer medical orderlies were required and specialized medical equipment for each group. Needless to say there was no lack of volunteers amongst the medical orderlies. Six groups rapidly went into training and medical orderlies were supplied for each group as it was formed. The medical equipment known as Ferret packs were worked out with great care. It was realized that they would not have a medical officer with them and that they would be in the jungle for long periods and at times even separated from the medical orderlies. Therefore a smaller first-aid pack was built up for each individual member and a larger and more comprehensive one for the medical orderlies. The contents of these packs had to be specially protected to withstand prolonged heat and soaking in the jungle. Some of the methods of protection of the drugs were quite ingenious. Tablets were carried in plastic rifle-oil bottles and they were fitted into the standard hold-all as issued with the

clothing scale and covered with a cellulose wrapping, easy to get at and completely waterproof. In the larger packs tablets were carried in stout glass screw-topped bottles which are used for certain media in pathological laboratories. These improvised packs served their purpose very well. Thermometers and instruments were carried in the shallow tin boxes normally used for transfusion outfits.

PENICILLIN TRANSFUSION CHEST

This chest was devised in order to meet the demand for transfusion of wounded and also to allow systemic penicillin therapy to be administered at the earliest possible moment. It was necessary to make it as compact as possible so that the R.M.O. could take it with him at any rate into the jungle area. After a short conference we decided what was necessary and a suitable and rather attractive wooden box was made by the local Chinese according to specification. Each box was divided into compartments to fit the contents. It was strong enough to stand up to parachute drops and for general rough usage. The box with contents could be carried in one hand and it certainly has been a success. My thanks are due to Major Symington, at that time Deputy Assistant Director of Pathology, Malaya Dist., for his painstaking work in ensuring that the contents of each box were in perfect condition before being dispatched. The plasma, glucose saline and distilled water were all checked under his personal supervision. The giving sets were all re-tested and re-sterilized. He also carried out exhaustive tests which proved that crystalline penicillin would keep its potency under jungle conditions for from two to three months. The contents of the box were as follows:

- 2 bottles of dried plasma
- 2 „ „ isotonic gluco-saline
- 2 „ „ distilled water
- 3 sterile giving sets
- 1 (4 oz.) bottle of sulphathiazole penicillin powder
- 8 bottles of 200,000 units of crystalline penicillin
- 1 pint of distilled water.

The chest was possibly a little bigger than a medical companion; it was naturally heavy for its size but was easily transportable and could be carried in one hand.

Arrangements were made for each box to be returned after use to the District Laboratory where they were immediately replaced. If not used they had to be returned after two months for checking and testing as regards sterility of contents and potency of penicillin. Clear and simple typewritten directions were inserted into each box to ensure that there could be no delay or confusion as regards the use of contents. This might almost seem unnecessary but in practice it was found useful and in fact essential. These boxes have been dropped successfully in the jungle. A supply is always ready for immediate dispatch by air as well as one for each medical officer who requires it for operations. The supply of these boxes has ensured the earliest possible use of transfusion and penicillin therapy in the jungle area.

We have now seen very briefly the pre-emergency picture, the emergency and a few of the medical supplies for that emergency and how they were met, including personnel and equipment, but I have not said anything about the actual evacuation of casualties from the forward areas. I would like to mention this in some detail. First of all it is essential to realize that there is no forward area in the strict sense of the word even during jungle operations, as hostilities may break out anywhere and at any time once troops move out of the large towns or outside the perimeter of their camp. Secondly, casualties may occur under such completely different circumstances that it is necessary to consider them under two headings.

- (1) Those occurring as the result of ambushing on main or secondary roads.
- (2) Casualties occurring in the jungle as a result of ambushing or direct assault.

As a result of this situation the planning for the evacuation of casualties has to be somewhat fluid as it is almost impossible to foresee in what region the next group of casualties is likely to occur. A comparatively large force may go out fully equipped with a medical officer, ambulances, a section of a Field Ambulance and all medical paraphernalia and engage in extensive sweeping operations and come back again after several days without any encounter with the enemy; while a small force working independently in an apparently safe area may run into an ambush resulting in most of the force being either wounded or killed.

Let me first try and give you a picture of a road ambush occurring on one of the secondary roads. Two lorries about 200 yards apart are travelling along a winding secondary road at about 35 miles an hour. Everyone is on the alert as it is known that bandits have recently been seen in the vicinity but the jungle on these smaller roads reaches almost to the roadside. Coming round a bend fire is suddenly opened from both sides of the road from completely concealed hide-outs, resulting possibly in the overturning of the first lorry as the driver is killed instantly. Casualties are 3 dead and 3 wounded in the first lorry. The second lorry has just managed to pull up before entering the zone of fire, the men have sprung out and are advancing as rapidly as possible on each side of the road to engage the ambushers. They may be successful and get one or two but it is more than probable that the bandits will have already melted into the jungle on each side of the road. It is a very unsatisfactory form of warfare in which all the aces appear to be in the hands of the bandits.

Each lorry is carrying a first-aid outfit including shell dressings and the men are equipped with their first field dressings. There will therefore be sufficient dressings to give reasonable first aid to the wounded. The men have now had first-aid lectures given by their own medical officer and should be able to deal with the patients until more skilled assistance arrives or until they are conveyed to a first-aid station or hospital, as it is not likely that this small party will have trained R.A.M.C. orderlies with them. The evacuation of casualties from road ambushes depends on local circumstances. If there is an

ambulance anywhere in the vicinity they may be able to contact it by telephone from the nearest village.

What generally happens is if an ambulance is not available that a private car is commandeered or a lorry used and the patients are moved as comfortably as possible to the nearest local hospital or civil dispensary. All civil hospitals have been instructed to inform the military authorities immediately they receive military casualties. This is in order that arrangements can be made to evacuate these cases to military hospitals as early as possible or if unfit to be moved to ensure that they are visited by a military medical officer at the first opportunity. The further evacuation of these cases may be by road, by air or by ambulance train according to location and circumstances.

EVACUATION FROM JUNGLE AREA

I want to consider a hypothetical case of a seriously wounded man deep in the jungle area belonging to a force with a medical officer attached. The patient we are considering is a strict stretcher case. He has been wounded when three days' march into the jungle. What can be done for him? His wound can be dressed with sulphathiazole penicillin powder, improvised splinting can be used, if necessary he can be given morphia. A shelter can be built very quickly for him and the medical officer may decide he requires a transfusion. Penicillin therapy can be started right away, but an air drop will be required in order to obtain a transfusion chest and a stretcher. The column is in wireless communication and in a matter of hours a transfusion chest and stretcher may be dropped successfully in a "clear space" as near as possible to the wounded man. If there are not sufficient hours of daylight this will have to be postponed until the following morning.

When the patient is fit to be moved (which may mean a matter of hours or days) the long trek back begins. It may have taken four days to penetrate to the area where the casualty occurred, travelling in single file, but it will take possibly sixteen days if not more for stretcher bearers to hack their way out carrying this wounded man on a stretcher and a great number of men will be employed as relief stretcher bearers. Eventually when the wounded man reaches the jungle entrance he will most likely be conveyed by a jeep fitted with stretchers until a road is reached suitable for an ambulance car to convey him to the nearest military or civil hospital with surgical facilities.

The evacuation of wounded from the jungle is one of the greatest snags of jungle warfare and it is certainly a big medical headache and a worry to all Commanders taking part in jungle warfare. A partial solution to this problem would have been the employment of trained elephants which are capable of forcing their way through the densest jungle at the rate of one mile in three hours. Wounded could be carried out and medical supplies such as stretchers carried in. They have been used in North Malaya on at least one operation with success but their general use has not been adopted. There are a certain number of trained elephants in the country and in my opinion sufficient use has not been made of them. It is admitted that they are vulnerable and difficult

to replace but their value would be well worth the risk of losing one or two through enemy action. The other partial solution is of course the helicopter, three of which are due to arrive shortly. How many lives will be saved by the use of a helicopter it is difficult to say, possibly only one or two, but there is no question about the effect on morale that the presence of a helicopter will give. The helicopter could hover over a "clearing" and extract the patient in a matter of hours when at present it means days or weeks of arduous toil to remove a stretcher case from dense jungle by manual labour.

THE ROLE OF THE FIELD AMBULANCES

There are two Field Ambulances now functioning in Malaya.

Both have fully justified their existence during the emergency although neither of them have been fully employed in the traditional manner, but that is entirely due to the nature of the country and the type of intermittent warfare against well-dispersed bandits.

The present role of these Field Ambulances is to have fully trained sections and if necessary an A.D.S. ready to take part in operations which are continuously being planned at Brigade and Divisional level. Owing to the nature of the country the formations operating in one area are rarely larger than 2 battalion strength. But a battalion operating in the jungle requires more medical support than that which can be provided by their own medical officer. Hence the value of trained sections of a Field Ambulance who are now experts in jungle warfare.

SUMMING UP

(1) The declaration of an emergency in Malaya did not find the medical organization unprepared.

(2) Requests for increases in medical personnel and equipment of a specialized nature were met with the minimum of delay and no red tape.

(3) The very urgent problem of extracting wounded men from the jungle has not yet found a satisfactory solution.

(4) The attachment of an air ambulance to Air Command would greatly add to the comfort of patients travelling by air in Malaya.

Finally the sympathetic and helpful support given to me at all times by the Medical Directorate G.H.Q. Singapore coupled with the whole-hearted loyalty given by medical officers, other ranks and civilians both on my own staff at District H.Q. and from medical formations throughout Malaya were outstanding features of this period.

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THE MEDICAL SERVICES IN AN ARMoured DIVISION

BY

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THE motive which prompts me to write this article is the fact that up to date quite a bit has been written about the Medical Services in the Infantry Division but little or nothing about that of the Armoured Division.

I should like to point out now that like many problems which are not connected with an exact science there may be a number of methods of achieving the solution to the problems presented, any one of which may work. What I say with regards to the medical units and their handling in the Armoured Division must be regarded in this light. I would at the same time point out, however, that what I offer now did work as I can testify, as I was A.D.M.S. of the Sixth Armoured Division for three years in the last contest and the tactical employment of the Armoured Division as a whole has not altered radically since.

The modern Armoured Division, although consisting of only two Brigades, one armoured and one infantry, comprises a formidable array of troops and is in fact overall numerically only slightly less than that of the Infantry Division. The reason in the main is that the Armoured Brigade consists of four armoured regiments and a motor battalion while the Infantry Brigade consists of four lorry-borne infantry battalions.

The medical units consist of two Field Ambulances and one Field Dressing Station. These units are standard units and differ in no way from those of the Infantry Division. The Divisional medical staff are also the same and the only material difference of any consequence which is found is that the A.D.M.S. is given an A.C.V. instead of an L.C.V. as in the case of the Infantry Division. The A.D.M.S. like his counterpart in the Infantry Division has his being at main Divisional headquarters.

The two main roles in which an Armoured Division can be said to be correctly employed are: (a) Leading an advance, and (b) the traditional role of pursuit.

In either case the Division may move considerable distances in the day (40 to 50 miles or more) for a period of several days.

Depending upon the terrain over which the Division has to operate (i.e. whether open or closed country) and the frontage given to the Division, the composition and order of march of each of the Brigades within the Division will vary considerably. The permutations and combinations are many, but in

the main, in so far as Brigades are concerned, there are two: (a) The Brigades moving in echelon with either the Armoured Brigade or Infantry Brigade leading: (b) the Brigades moving two up, when the Brigades are mixed, comprising both armour and infantry. The motor battalion becoming the Divisional Commander's reserve.

Before going on to consider the tactical handling of the medical units to compete with the foregoing I would like to say something about the extra medical units, etc., which may be required to deal adequately with these long "swans." One has to realize that the Armoured Division moving as it does rapidly over considerable distances soon gets out of range of the corps medical centre and of course surgery. It is to be remembered that an abdominal case unless operated on within ten hours of receiving his wound stands very little chance of survival.

If, therefore, the "swan" is likely to be long and protracted the A.D.M.S. will have to ask the D.D.M.S. Corps for the wherewithal to form an advanced surgical centre (i.e. one F.D.S. additional to the divisional one, two field surgical teams and one field transfusion team). He will also have to ask the D.D.M.S. for extra ambulance cars to compete with the long hauls. Each case has to be judged on its own merits but I used to ask for a platoon of M.T. Coy. R.A.S.C. (M.A.C.) and generally got at least three sections (i.e. 18 cars).

Two things have to be remembered when dealing with an Armoured Division:

(a) The first is that it operates on a centre line, that is a line taken on the map, generally a feature (e.g. a road), or a series of features, but on occasion it is merely a compass bearing. It is, for reasons which will be obvious to all, never a water feature such as a river or canal. The Division moves astride this line and the main installations, e.g. main and rear Divisional Headquarters, A.D.S., etc., are sited on or near to it.

(b) The second thing to be remembered is that an Armoured Division when employed in its normal role gets relatively few casualties.

It will be appreciated that the Division moving as it does over what may be considered to be a fair distance in the day, the A.D.M.S. has to ensure at all times that a dressing station is open at strategic points on the Divisional centre line to which casualties from C.C.P.s may be evacuated. This he does by keeping control of the headquarters (A.D.S.s) of both Field Ambulances while the companies are placed under Brigade control. The O.C. each Field Ambulance is centred on Brigade headquarters during operations, with the task of clearing casualties with the company from their respective Brigades to the open A.D.S.

The A.D.M.S. leap-frogs the A.D.S.s up the centre line opening them at strategic points where he considers they will best serve the needs of the division.

In an advance or in a pursuit, in the initial stages, the order or march might be:

(a) Sections of the companies of the Field Ambulances affiliated to Brigades in support of regiments/battalions or regiment/battalion groups (*see* figs. 1 and 2). The company headquarters plus the uncommitted section or sections, if any, moving with respective Brigade headquarters.

(b) The leading Field Ambulance less its company moving on the Divisional centre line, under command of the Brigade for movement and prepared to open an A.D.S. as and when required (*see* fig. 3).

(c) The other Field Ambulance less its company, under command of the A.D.M.S. and moving with the main Divisional Headquarters group.

When the headquarters (A.D.S.) of the leading Field Ambulance has been opened by either the O.C. of the Field Ambulance concerned or the A.D.M.S., as an A.D.S. it reverts to Divisional control and from thence on the A.D.M.S. controls the opening, closing and movement of both A.D.S.s till the conclusion of the operation.

In action the Field Ambulance Commander is centred on Brigade Headquarters and acts as the S.M.O. of the Brigade.

The Divisional F.D.S. is controlled by the A.D.M.S. and it is moved in bounds, probably every three or four days as the situation demands.

The Corps F.D.S. plus the F.T.T. and the F.S.T.s, if such units are under command of the Division, for movement, move with the Divisional troops group.

With regards to the platoon of the M.T. Coy. R.A.S.C. (M.A.C.) it is suggested that one section (6 cars) is given to each S.M.O., two sections to the leading A.D.S., and the remaining one, as the A.D.M.S.s reserve, to the other A.D.S.

The evacuation of casualties is in principle the same as that from the Infantry Division (i.e. from R.A.P. to C.C.P., C.C.P. to A.D.S., where they are classified Ps.1, 2 and 3, the light sick going to the Divisional F.D.S.) except that the evacuation of casualties from the squadron/company in the armoured regiment, armoured car regiment and the motor battalion is undertaken by armoured ambulance car and not by stretcher bearers. When an advanced surgical centre is formed normally only Ps.1 and 2 are sent to this centre, the Ps.3 continuing to go to the C.C.S.

It will be appreciated from what has been said that in order to command and control this "set up" good communications are a *sine qua non* and therefore wireless is necessary. Fig. 4 shows the medical wireless net as it is at present in the Armoured Division, this is a long way short of what is required and fig. 5 shows the net as it will be in the near future. This latter net is what is considered to be the essential minimum for the Medical Services of an Armoured Division and it is what we had, in effect, in the Sixth Armoured Division. It is considered that all officers and 10 per cent of both R.A.S.C. and R.A.M.C. other rank personnel be trained and proficient in the use of R.T. procedure. It is worthy of note that the control sets of both the "gunner" and

"sapper" nets are situated at main Divisional Headquarters and thus information regarding the medical layout can be readily sent out to these two potential casualty producing arms of the service in the Division.

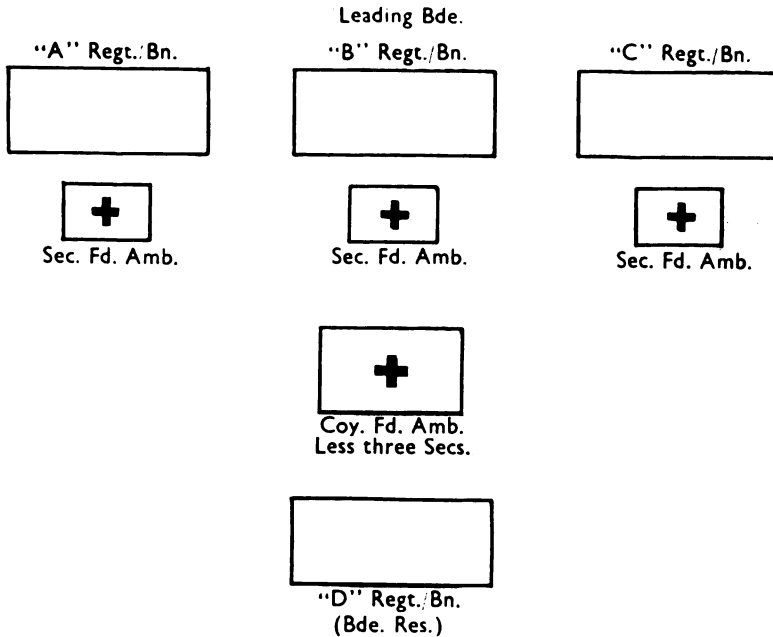


FIG. 1.—Brigades moving in echelon.

N.B. Should the fourth Regt/Bn. be committed independently the section from the headquarters of the leading Fd. Amb. is available to be put in support if required.

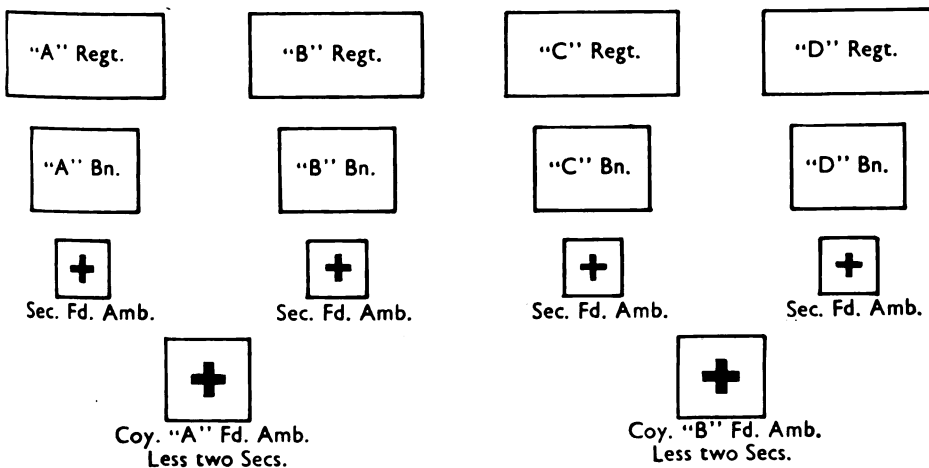


FIG. 2.—Brigade moving in Regt/Bn. groups.

Finally before I close I should like to say that the normal role of the Armoured Division is as I have described (i.e. that of leading an advance or a pursuit), but owing to limitations of man-power and equipment the Division or parts of it may find itself doing all manner of things. In the Sixth Armoured Division we found ourselves in the Apennines in Italy participating in mountain warfare, on our feet, with the Divisional reconnaissance regiment, acting as stretcher bearers. We also undertook two river crossings among other things and the armoured brigade supported the infantry of an Infantry Division, as an independent Armoured Brigade on more than one occasion. The reason these facts are mentioned is to make the point that when such things do occur the tactical handling of the medical units of the Armoured Division or that part of it assigned for the task differs in no way from those of the Infantry Division, independent Armoured Brigade, etc., when undertaking a similar role.

I should like to thank Brigadier R. D. Cameron, Inspector of Training, Army Medical Services, for his helpful criticism of this article.

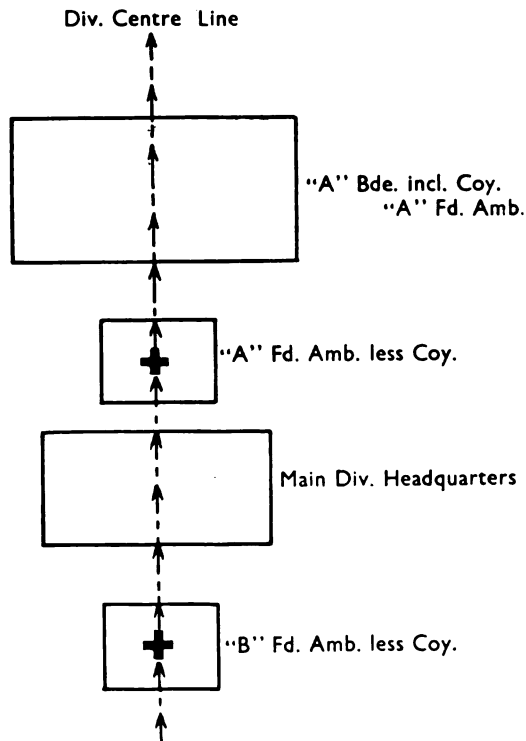


FIG. 3.--Disposition of Field Ambulances less Coys.
In order of March.

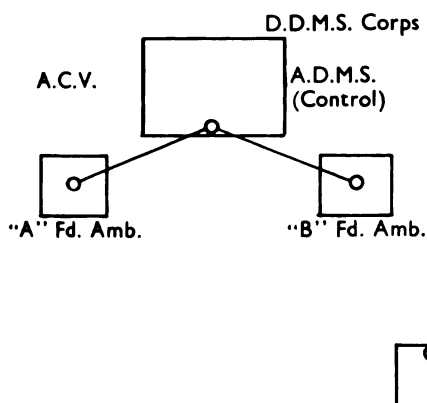


FIG. 4.—Wireless net as it is at present.

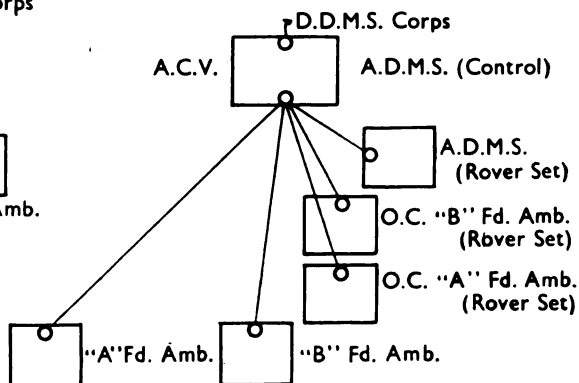


FIG. 5.—Wireless net as it will be in future.

For the benefit of our readers who are not quite *au fait* with the latest developments in the latest esoteric alphabetical terminology so fashionable today, we append a glossary.

- A.C.V. Armoured Command Vehicle.
 A.D.M.S. Assistant Director of Medical Services.
 A.D.S. Advance Dressing Station.
 C.C.P. Casualty Collecting Post.
(Not Clearing.)
 D.D.M.S. Deputy Director of Medical Services.
 F.D.S. Field Dressing Station.
 F.S.T. Field Surgical Team.
(F.S.U. Field Surgical Unit is now obsolete.)
 F.T.T. Field Transfusion Team
(F.T.U. Field Transfusion Unit is now obsolete.)
 L.C.V. Lorry Command Vehicle.
(Note—NOT Light.)
 Ps.1, 2, 3. Priorities in that order.
(NOT Patients.)
 R.A.P. Regimental Aid Post.
(A curious survival as a Regiment is seldom in the forefront of Battle.)
 R/T Radio Telephone.
 S.M.O. Senior Medical Officer.
 "Swan"
 (a) To wander around vaguely but with some valid excuse or objection if found so doing. (Australian, cf. "Swanning around.")
 (b) To carry out an operation in the form of a "hook" or an enveloping movement. Derived from the shape of a Swan's neck (VIII Army—probably derived from its original Australian elements. Cf. "Waltzing Matilda"). The meanings are in sharp contradistinction (a) Vague, (b) Very certain. It may be applied to any long-distance Armoured Reconnaissance or Manœuvre when the leading elements are uncertain as to whether they will find themselves encircling the enemy or back where they started.

SOME NOTES ON SERVICE IN WEST AFRICA COMMAND

BY

Brigadier E. P. N. CREAGH, M.B., M.R.C.P.

D.D.M.S., West Africa Command

DURING the war a very large number of R.A.M.C. officers and other ranks served in West Africa and left it after some eighteen months to two years of somewhat suspended animation with very mixed feelings. No country is seen at its best in wartime, even if it is not itself in a zone of hostilities.

This Command is off the beaten track and has only grown up as a result of the war; it is felt, therefore, that a few facts about it might be of interest.

Headquarters, West Africa Command, is in Accra, Gold Coast. It is well situated on a site which had housed a large American wartime camp, and is now known as Giffard Camp. The Medical Staff (officers) consists of a D.D.M.S. (Brigadier), an A.D.A.H., an A.D.A.N.S., a D.A.D.M.S. (non-medical).

The Command is spread over four colonies. Nigeria District is far the biggest and has two hospitals. West Africa Military Hospital, Kaduna, in the north, with 150 beds, commanded by a Lieut.-Colonel who is also Senior Medical Officer, North-East Sub-District and administers Zaria to the north and Enugu to the south-east. West Africa Military Hospital, Lagos, is a hospital of 100 beds commanded by a Lieut.-Colonel (a new establishment) who is also Senior Medical Officer, Southern Nigeria, and is responsible for two out-stations on the road north—Ibadan and Abeokuta. In addition to the staff of these hospitals, the four stations already mentioned have one medical officer each.

The appointment of A.D.M.S. Nigeria District has, quite recently, been abolished.

THE GOLD COAST

West Africa Military Hospital, Accra, of 200 beds and a Families Wing of 20 beds, is commanded by a Lieut.-Colonel who is also Senior Medical Officer, Gold Coast District. The staff includes Specialists in Surgery, Medicine, Gynaecology, Pathology, and Radiology. There are three out-stations staffed by medical officers: Takoradi—the only port with a harbour: Kumasi, in Ashanti: and, well to the north, Tamale.

SIERRA LEONE

West Africa Military Hospital, Freetown, of 50 beds, commanded by the Senior Medical Officer, Sierra Leone and Gambia District, has a staff of 2 or 3 medical officers and has only one out-station—Daru. The hospital and military

station generally are excellently situated well up on the hillside. There are wonderful views in all directions.

THE GAMBIA

One Company of the Gambia Regiment is stationed at Bathurst. It is cared for by the Colonial Medical Service and visited occasionally by the Senior Medical Officer, Sierra Leone and Gambia District.

The Q.A.R.A.N.C. are represented by the A.D.A.N.S. at Command Headquarters and some thirty nursing officers spread over the four hospitals.

A glance at a map will show that the Command stretches over an immense area, approximately 1,700 miles from East to West, and involves the D.D.M.S., who endeavours to visit all units at least twice a year, in a considerable amount of air travel and very pleasant and interesting visits. The professional work is interesting and sometimes, taking the climate into consideration, somewhat arduous. Professionally the best liaison exists with the Colonial Medical Service, who provide specialists in emergencies and afford considerable help in every way, which the "Army" endeavours to repay as and when occasion allows.

Some remedial surgery is done on the African soldier, but operations on European personnel are limited to emergencies.

The physician meets a wealth of clinical material seldom seen elsewhere by the R.A.M.C. officer, and is constantly kept guessing over African cases. One very intelligent young member of the Royal College states that the obscure problems he constantly encounters have made him feel very humble.

For the ardent venereologist this Command is a paradise, if one may use this word in this connexion; there are many fallen angels.

ACCOMMODATION

Bachelors and those awaiting the arrival of their families are reasonably well housed and have comfortable Messes.

The question of married quarters is as big a problem here as almost everywhere else these days. The tour of duty in West Africa is now three years, with a break of three months' leave in the U.K., with free passages for families each way, after eighteen months. There is a married quarter available for the Officers Commanding Hospitals at Accra, Freetown and Kaduna, which the O.C. may hope to occupy almost immediately after arrival, but all other officers must take their turn in the general pool.

This works out to the effect that there is practically no hope of getting a Government married quarter during the first eighteen months.

Civilian houses can be obtained with difficulty, they are generally expensive and sometimes of a very poor standard. When an officer can satisfy his District Headquarters that he has obtained satisfactory accommodation, War Office are informed and his family are given passages. The general experience in this

respect is that "Where there's a will there's a way," but it is often a fairly grim way.

Trooping to and from West Africa is now entirely by air, but families can in certain circumstances be transported by sea if they so prefer.

CLIMATE

There is great variation in this respect, both according to the time of the year and the location of the station. Lagos, for instance, is hot and humid for most of the year, but can be very pleasant during August, September and October, and this more or less applies to Accra, where conditions are pleasanter from June to October. The mean temperature in Accra for most of the year is 87 to 90° maximum and 72 to 75° minimum, with relative humidity 80. The climate in stations in the Northern Territories of both colonies tends to resemble what we knew in India—hot and dry in the day, with reasonably cool nights.

During the Harmattan season in the winter, and particularly in the north, the atmosphere becomes uncomfortably dry, and a dust haze reduces visibility to a few hundred yards. It is cool, but many dislike it. The Harmattan wind blows from the Sahara. This state of affairs may last intermittently for two to three months.

The climate in "Hill Station," Sierra Leone, is quite reasonably pleasant except in the Rainy Season, which lasts for many months—May to October. The rainfall is prodigious and tends to limit all activities.

Everyone takes one tablet of Paludrine daily and the malarial incidence is low, but unfortunately it has been abundantly proved that this drug is not a true causal prophylactic against some West African strains of M.T. malaria. Europeans keep quite reasonably fit, but it is very difficult to regain one's sense of well-being after even a comparatively trivial illness.

With the exception of the Jos plateau (4,000 feet) in Nigeria, there is no hill station.

Children never look as well as in a temperate climate, but for the most part keep quite fit. They should never remain in the country after the age of 8. Education is practically limited to that afforded by the Army Schools.

The cost of living, despite the fact that drinks and smokes cost less than in the U.K. (a bottle of whisky costs £1 and 50 cigarettes just under 5s.), is very high. Food is reasonably good. The general standard of servants is considerably below that of India; there are good steward-boys and cooks, but they are hard to find.

Extra pay and allowances go a long way towards maintaining a state of solvency.

SPORT

Bushfowl are found almost everywhere and give quite good scatter gun shooting; in Nigeria and the Northern Territories of the Gold Coast one often gets a chance of guinea-fowl as well. The prospect of rifle shooting is not

bright, game can seldom be got from any station without going long distances, and then with difficulty. The West African is almost starved of meat, so that few deer or buffalo (Bush Cow) survive.

River fishing for giwan rua and tigerfish can be had, and sea fishing in Lagos for barracuta sometimes affords good sport, but it is not a fisherman's country.

Polo is available in Kaduna, Lagos and Accra. It costs from £10 to £15 per month to keep two ponies. It seldom reaches Indian standards, but one gets great exercise and a lot of fun.

Almost every station has a golf course, and despite the fact that they have their limitations this is a very popular game on the Coast. Tennis is available everywhere.

There is serious racing in Accra and Lagos. In the former station there is a very flourishing Turf Club with an electric tote dealing with thousands of pounds on each race, and a photo-finish apparatus. It has become customary for the D.D.M.S. to act as a steward. Taking into consideration the quality of the horseflesh, which is all indigenous, the racing is surprisingly good. There is a more amateur type of racing in Northern Nigeria, where the "Captains" have a bump, and even their wives.

A car is an essential. The roads in and around stations and some main roads are good, but the latterite surface that one often meets in the country is calculated to shake the most robust of cars to pieces in a short time. Petrol is unrationed.

Everywhere one goes on the Coast one finds a very pleasant social life and wonderful hospitality.

Altogether, if one discounts the climate and the many minor frustrations, it can be safely said that an R.A.M.C. officer or other rank serving in the West Africa Command has the possibilities of living an interesting and pleasant life. Now that the scope for foreign service has been so much reduced, there are many worse places in which to serve.

SCIENTIFIC METHODS AND SOME SERVICE PROBLEMS

Conference of M.R.C. Workers and Service and Industrial M.O.s

REPORTED BY

Colonel A. E. CAMPBELL, M.D.

Professor of Army Health

HARD things are often said of specialists by the we-do-all-the-work classes and research workers have not been sacrosanct. Those demands for transport to urgent investigations, those vehement criticisms in committee of the official mind as expressed in regulations may have created at times the impression that the "heaven borne" are to be found in other than religious or administrative circles.

Unjustifiable as such an impression might be there seems to be a need (if wartime experience counts for anything) for more knowledge in the Service of the ways and motives of the research worker. If the more ordinary worker could be convinced of this need, perhaps the pursuit of the necessary knowledge would lead to better general acquaintance with "the field" in which the research worker may find scope and facility.

Holding these views, it was intriguing to hear of a conference to be arranged by the Medical Research Council between its workers and Service and industrial medical officers. The scene was the London School of Hygiene whose large lecture theatre was filled to capacity on the last three days of March and in one of whose laboratories were displayed exhibits and demonstrations of the work of the various M.R.C. units now in existence throughout the country.

It was interesting to attempt to identify members of the audience and to note any difference in the appearance of industrial and Service M.O.s and research workers. Hair styles are less reliable than they used to be.

The conference was opened by Dr. H. P. Himsworth, Secretary of the Medical Research Council, who outlined the scope of the subjects to be dealt with.

The first of the series of lectures on scientific method in field surveys was given by Professor Bradford Hill who by his lucid discussion of general principles provided an admirable introduction reminiscent of his most acceptable writing on medical statistics.

Two other medical statisticians (Drs. Reid and Doll) followed Professor Hill and gave accounts of actual surveys, one of absence due to sickness amongst G.P.O. workers and the other of occupational factors in peptic ulcer.

In the afternoon Professor J. H. Squire of Birmingham University spoke of the relationship between field surveys and laboratory research and of the necessity for clear statement of the problems undertaken. He referred to some

of his own early experiences in the Army of military personnel research and drew lessons from them.

Dr. Alice Stewart, Acting Director of the Institute of Social Medicine at Oxford, in the last lecture of the day, gave a most interesting account of work on occupational and domiciliary factors in pulmonary tuberculosis.

From 5-6 p.m. on each day laboratory demonstrations were given by members of the various M.R.C. units concerned in the conference, e.g. Pneumokoniosis, Toxicology, Industrial Medicine, Applied Psychology, etc. Here was opportunity of meeting the research worker on his own ground and of asking those questions which bring pleasure (or irritation) to the demonstrator.

The second day's proceeding opened with a masterly lecture by Dr. Donald Hunter on "Fluorosis and Berylliosis as Industrial and Community Health Hazards." Factual information was great and very valuable as a guide to the extent of these hazards and the further work that was necessary.

Reference to B.A.L. struck a familiar note and was amongst the subjects dealt with by Dr. Barnes of the Toxicology Research unit who spoke on "The use of Experimental Pathological Techniques for the assessment of the Toxicity of Chemical Compounds."

In the afternoon Dr. T. Bedford, well known for his writing on environmental conditions, spoke on "The effects of warmth and comfort on efficiency." He was followed by Dr. Weiner and Dr. Darous of the Climate and Working Efficiency Unit who discussed effects of heat and anatomical factors in machine designs.

On the final day, Professor Sir Frederic Barlett spoke on the "Laboratory Analysis of Human Activities" and had something to say as well on the study of efficiency, the elimination of fatigue and the likely decrease in the satisfaction which might be obtained from work.

The final meeting of the conference was devoted to an account of the work of the Pneumokoniosis Research Unit at Cardiff and of problems of investigation, of selection of cases for examination and of assessment of symptoms.

Dr. Himsworth in closing the conference referred to the combination of fundamental laboratory work and field work, to the necessity for recognition and definition of problems and to the translation of laboratory solutions into the language of the executive. His audience were appreciative of this summary.

The Service representatives who voiced appreciation (Major-General T. Young for the Army) referred to the value of the conference not only in methodology but also in the range of factual detail of the work of the M.R.C. units.

Dr. Himsworth and the other speakers must have been addressing a concentration of industrial and Service medical experience which has not been equalled since the war. On his side there must have been few occasions when

the might of the M.R.C. has been massed to the same extent for public view and hearing.

Is it too much to hope that for Service purposes at any rate, the same parties might meet again to mutual benefit? It may be that the younger research worker for instance might benefit from further acquaintance with Service conditions and tradition and that the Service Officer, regarding research methods, might not excuse himself in the words of the Psalmist.

"Lord, I am not high minded; I have no proud looks. I do not exercise myself in great matters which are too high for me."

Psalm 131, verses 1, 2 (Prayer Book version).

HOW TO PREPARE AN ARTICLE FOR A MEDICAL JOURNAL

(Originally published as an A.M.D. Bulletin in 1942)

MANY of the classical reports of medicine have been written under difficulties by serving officers; and even those with no exceptional opportunities often make observations worth recording. Unfortunately some observers are so bothered by the technique of authorship that they never write at all; while others pay it so little attention that they produce bad papers. Provided he has something to say, anyone can write a good paper if he takes pains. But no one—whatever his literary gifts—can write a good paper unless he takes pains.

The first essential is a plan. A mass of facts and ideas has to be disciplined into an efficient unit, and this can best be done by organizing it into sections under headings and sub-headings, some of which may be dropped later. More often than not, the material will fall naturally into the conventional sequence: (1) Introduction; (2) Observations; (3) Investigations; (4) Discussion; (5) Conclusions; and (6) Summary. The Introduction explains why the paper is written—to record instructive cases, to propose or examine a method of treatment or to solve a medical riddle. In describing the Observations or Investigations, or both, the aim should be to give a simple and precise account of what the author actually saw and did, bearing in mind that illustrative cases or experiments may be just as informative as complete protocols, and much more digestible. As a rule deduction and speculation are conveniently reserved for the Discussion, where the author can relate his data and opinion to those of other people ("the literature"). When Conclusions are reached they should be plainly set out under a separate heading: and here the reader is entitled to some sort of answer to any questions raised in the Introduction. Normally the Summary can be combined with the Conclusions in a few short sentences; but any paper that is more than a note must have either one or both of these sections. Much care should be taken over them, remembering that they offer the best chance of interesting English readers and will be the basis of any foreign abstracts. A concise title is also an asset.

When the paper has been written it should be rewritten. An author's best friends (it is said) are a month's delay and several candid critics; but even without outside help he can always improve his performance by repeated revision at longish intervals. This will reveal gaps in the argument, paragraphs under inappropriate headings, and above all, superfluities of fact and phrase. Faults, minor or major, will become obvious with each new copy, and the drafts ought if possible to include at least one in typescript for final correction. If an article is worth printing once it is worth printing twice: and (whatever the paper

shortage) the finished product should be typed in double spacing on but one side of the sheets. Only quoted passages may be in single spacing, and these must be verified to the last comma. References must likewise be confirmed from their original sources, giving the names and initials of authors, the full name, year, volume and page of journals, and the full name, and the place and year of publication, of books. If not personally checked they should be qualified by the words "quoted by....."

Like the references, all illustrations and tables should be attached to the end of the article; they should be on separate sheets and numbered Fig. 1, 2, 3, and Table I, II, III, etc., to correspond with their mention in the text. Charts and drawings are best done in indian ink on white or blue-squared paper; but unless the draughtsman is experienced in such matters the lettering should be left in pencil, so that the editor can suit its size to his scale of reduction. Each illustration and table should have a "legend"—a line or two telling what it shows. Recognizable photographs of patients cannot be reproduced without written leave from the patient or his representatives.

MATTERS OF INTEREST

THE Director-General attended the Annual Banquet of the West London Medico-Chirurgical Society, which was held at the Royal College of Surgeons on June 2, 1950, and was one of the speakers in replying to the toast of the guests.

THERE was a Guest Night at the Headquarter Mess on June 1, 1950, when the guests were Sir Cecil Wakeley, President of the Royal College of Surgeons, and Air Marshal P. C. Livingston, Director-General of the Royal Air Force Medical Services.

The Director-General said that Field-Marshal Sir William Slim and Sir John Charles, Chief Medical Officer to the Ministry of Health, had both been unavoidably prevented from attending.

Notices

ADMISSION OF RETIRED OFFICERS TO MILITARY HOSPITALS

UNDER the National Health Service Act 1946 (and the other Acts relevant to Scotland and Northern Ireland), all civilians resident in U.K. became entitled from July 5, 1948, to free hospital treatment in National Health Service Hospitals. Under arrangements since made by the Service Departments with the Health Department, free treatment in Service Hospitals is also made available to civilians in certain cases.

Retired officers, since they fall under the heading of civilians, are therefore notified that they may be admitted to military hospitals as follows:

- (a) In the case of retired officers requiring treatment for a disability for which they are in receipt of disability retired pay, by the authority of the D.D.M.S. Command, on receipt of a direct application by the individual concerned or by the doctor treating his case.
- (b) in cases other than (a) above:
 - (i) in emergency, on authority of O.C. hospital who must obtain subsequent approval and covering authority from the A.D.M.S. District.
 - (ii) In other cases, by authority of A.D.M.S. District, on receipt of an application from the Senior Administrative Medical Officer of the Regional Hospital Board.

(Note with regard to cases under (b): owing to the present shortage of Q.A.R.A.N.C. officers the number of beds that can be adequately maintained by military hospitals is so limited that cases of *chronic* illness cannot be admitted to military hospitals.)

Issued by A.M.D.3 (a) March 25, 1950.

Obituary

Major DAVID CHARLES BAXTER

MAJOR DAVID CHARLES BAXTER died on April 15, 1950. He was born on May 25, 1879, and enlisted on July 12, 1897. After 17 years and 29 days in the ranks and 274 days as Warrant Officer he was commissioned Hon. Lieut. and Quartermaster on May 9, 1915. He retired on May 25, 1934, as Major and Quartermaster.

He was recalled on September 23, 1939, and released on January 8, 1948, when he was serving at the Northern Command Medical Stores.

In South Africa he took part in the operations in Natal in 1900 and in the Orange Free State, receiving the Queen's Medal with two clasps and the King's Medal with two clasps.

He served in France from March 1915 till November 1919. He was mentioned in despatches and received the *O.B.E.*, 1914-15 Star, British War and Victory Medals.

He served in Iraq in 1919 and 1920 receiving the Medal with clasp.

Colonel DONALD FRANCIS MacKENZIE, D.S.O., M.B.

COLONEL DONALD FRANCIS MacKENZIE, *D.S.O.*, M.B., late R.A.M.C., died suddenly in Chalfont St. Giles on June 3, 1950. He was the second son of the late P. W. J. MacKenzie, of Dover, where he was born on May 26, 1881. He was educated at Dover College and Edinburgh University where he graduated M.B. in 1905. He took the D.T.M., Liverpool, in 1906.

He was first commissioned in 1907 and retired as Colonel in May 1938 taking up the Retired Pay Appointment at Berwick-on-Tweed the same year. He was appointed A.D.M.S., Headquarters, Glasgow, in September 1939 and reverted to Retired Pay in January 1942.

He served in France from September 1914 till the end of the war. Thrice mentioned in despatches, he was awarded the *D.S.O.*, the 1914 Star and Clasp, the British War and Victory Medals.

Reviews

DISEASES OF THE AORTA: DIAGNOSIS AND TREATMENT. By Nathaniel E. Reich, M.D., F.A.C.P. New York. The Macmillan Company, 1949. Pp. 288.

The anatomical delimitation of this work gives its author scope for review of a wide range of information which has become relevant to his subject within

recent years. Pathological consideration of congenital abnormalities, the encroachment of surgery on their treatment and the introduction of new diagnostic methods warrant his adoption of the restricted field, and the reader will be indebted to him for the focus of attention produced. Following a brief review of anatomical and physiological factors forty pages are devoted to congenital abnormalities. Atherosclerosis is then dealt with, and in this part of the work strict anatomical boundaries implied in the title have of necessity to be set aside. In passing it is of interest to note that in the author's opinion surgical measures are applicable to probably not more than four per cent of cases of essential hypertension. Syphilis, diseases affecting the origin of the aortic lumen and dissecting aneurysm are then treated, followed by a chapter on occlusions of the aorta and one on the rarer disease processes which may be found in the vessel. Diagnostic procedures are subdivided into those requiring the use of X-ray equipment and those not concerned with its use. Two chapters on therapeutics are mainly concerned with antibiotics and anticoagulants. The plates reproduced and other numerous illustrations are excellent, and those who wish a simple presentation of the wide range of apparatus and method which can be brought to bear on the elucidation of the conditions treated will appreciate this work. Those interested in the purely clinical aspects of the subject will find what they seek expressed briefly and with precision.

J. B.

THE PREVENTION OF BURNS IN THE HOME. By Leonard Colebrook, M.B.Lond., F.R.C.O.G., F.R.S. London. Fire Protection Association. Pp. 20.

The text of this pamphlet is an abridged and slightly amended version of a report which appeared in the *Lancet*, July 30, 1949. The author begins with a statistical survey of the incidence of burns pointing out the high proportion of burns which occur in the home and the special risks to which the very young and the very old, especially the females of both groups are subject by contact of their clothing with unguarded fires, whether open fires, gas fires or electric fires. He also surveys the other causes of burns in the home. These figures are a timely warning of the ever-present danger in our homes.

The vast majority of these accidents are preventable and the author calls for an attack on the problem from all its aspects. The points in prevention which he stresses are:

- (1) Education and propaganda.
- (2) Safe methods of heating houses by central and perhaps district heating and by the wider use of convection heaters.
- (3) The wider use of non-inflammable materials for the clothing of girls and women.
- (4) Better design of guards for coal fires and facilities for fixing them in place so that children cannot remove them.
- (5) Improved design and protection of gas and electric fires.

JOURNALS RECEIVED

THE following journals have been received and are available in the Library of the R.A.M. College.

Medical Press, Canadian Journal of Public Health, Bull. of Hygiene, B.M. Journal, Lancet, British Journal of Dermatology and Syphilis, Glasgow Medical Journal, Birmingham Medical Review, St. Bartholomew's Hospital Journal, U.S. Armed Forces Medical Journal, South African Medical Journal, Trans. and Studies of the College of Phys. of Philadelphia, Medical Journal of Australia, Clinical Journal, Tropical Diseases Bulletin, Post-Grad. Medical Journal, Military Review, Rivista Militare, Jour. of the Royal Inst. of Public Health and Hygiene, Journal of the R.A.S.C., Proc. of the Royal Society of Medicine, British Journal of Surgery, East African Medical Journal, Chronicle of the World Health Organization, Bull. of John Hopkins Hospital, Edinburgh Medical Journal, Royal Melbourne Hospital Reports, Indian Medical Gazette, King's College Hospital Gazette.

Extracts from the "London Gazette"

PROMOTIONS

(1) *R.A.M.C.*

- (a) *To be Colonels:—*
 Lt.-Col. (Local Brig.) A. McMillan, M.B., F.R.C.S. 24.5.50
- (b) *To be Lt.-Cols.:—*
 Major A. F. H. Keatinge, M.C., M.B. 24.5.50
- (c) *To be Majs.:—*
 Capt. N. H. Stewart, M.B. (S.S.C.) 21.2.50
- (d) *To be Capts. (Short Serv. Comms.):—*
 Lt. C. M. C. Smelt, M.B. 8.5.50
 Lt. W. O. Backus 8.5.50
 Lt. C. R. Innes 7.8.49

(2) *R.A.D.C.*

- To be Majors:—*
 Capt. C. S. Rooke 22.4.50
 Capt. R. A. Nicol 7.5.50

APPOINTMENTS TO REGULAR AND SHORT SERVICE COMMISSIONS

(1) *R.A.M.C.*

- (a) Lt. Robert John Collins Hart from National Service List, to be Lt., Short Serv. Comm., 4th Apr., 1950.
- (b) Donogh Declan O'Brien, M.B., to be Lt., Short Serv. Comm., 16th Apr., 1950.

SPECIAL APPOINTMENT

(1) *R.A.M.C.*

Brigadier R. D. Cameron, *C.B.E.*, *M.C.*, M.B., late *R.A.M.C.*, is appointed a Director of Medical Services and is granted the temp. rank of Maj.-Gen., 3rd April, 1950.

RETIREMENTS

(1) *R.A.M.C. and Late R.A.M.C.*

- Capt. P. J. Murphy, M.B. (S.S.C.) 29.4.50
 Capt. A. C. Cobban (S.S.C.) 5.5.50 (Hon. Maj.)
 Capt. P. A. T. Wood, M.B. (S.S.C.) 5.5.50 (Hon. Maj.)
 Capt. I. K. R. McMillan (S.S. Type B.) 29.5.50 (Hon. Maj.)

EDITORIAL NOTICES

The Editor will be glad to receive original communications upon professional subjects, travel, personal experiences, etc.

Correspondence on matters of interest to the Corps, and articles of a non-scientific character, may be accepted for publication under a *nom de plume*.

All Communications or Articles accepted and published in the "Journal of the Royal Army Medical Corps" will (unless the author notifies at the time of submission that he reserves the copyright of the article to himself) become the property of the Library and Journal Committee who will exercise full copyright powers concerning such Articles.

A free issue of twelve reprints will be made to contributors of Original Communications, and of twelve excerpts in the case of Lectures, Travels, Clinical and Other Notes. Such free reprints or excerpts will, however, owing to the shortage of paper, only be sent to those specifying their wish to have them, and a request for them should accompany the article when submitted for publication, the request being made in the form of a note at the foot of the manuscript.

Reprints or excerpts, additional to the above, can be furnished on payment if specially ordered at the time of submission of the article for publication.

Communications in regard to editorial business should be addressed—"The Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, A.M.D.2, War Office, London, S.W.1."

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Communications in regard to subscriptions, change of address, etc., should be addressed "The Manager, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, R.A.M. College, Millbank, London, S.W.1."

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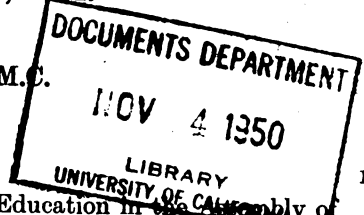
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Journal of the Royal Army Medical Corps.

Editorial

At Random

I—THE USE AND ABUSE OF MORPHINE

OSLER, while giving a clinical demonstration on a case of double cystic kidney¹, discussed the merits and demerits of opium therapy and particularly the abuse of its derivatives, including morphine. He, who used to emphasize the need for knowing, really knowing, the drugs which we prescribed, used to place morphine at the head of his short list of valuable natural drugs and called it the G.O.M. of medicine or God's own medicine.

In the present day, with the advent of new synthetic drugs, the therapeutic picture has perhaps changed. But even now the use, judicious use and not abuse of morphine appears to provide a very valuable weapon in the armamentarium of the thoughtful physician. Perhaps this statement may provoke the most modern of our physicians into hot denial or even into argument. We sincerely hope it will be so.

The chronic use of opium and of morphine is distinctly a two-edged weapon which may well produce finally that distressing condition of "morphinism," than which there are few harder conditions to treat with assured success.

In the East, particularly India and China, the daily consumption of opium is far from uncommon; so much so, that the authorized ration scales for Indian troops included the required quantity of opium as a daily ration given on a standing medical order, even on active service. The detrimental results were stated to be few and the habit compatible with longevity and continued efficiency; though our experience was that efficiency suffered and the unit was best rid of these undesirables.

Quite recently in our contemporary across the Northern Atlantic² the

¹A somewhat unique case of early diagnosis of double cystic kidney in a ward at the Radcliffe Infirmary, Oxford, July 1914.

²*United States Armed Forces Medical Journal*, Vol. 1, No. 2, February 1950, page 247. Editorial.

subject of the (Ab)use of Morphine has been given prominence in one aspect of its bearing on military medical training.

In this, the traditional, almost automatic use of morphine for or in the treatment of wounded men is quite severely criticized. It is stated that careful observations of Beecher, based on an analysis of 215 recently wounded men, do not bear out the common belief that the wounded invariably suffer pain and therefore immediately need an analgesic and that consequently morphine or possibly some substitute thereof, such as the better analgesic modern product Physeptone, should invariably be given.

Beecher analysed his 215 cases, which included 50 compound fractures of long bones, 50 extensive soft tissue wounds, 50 penetrating thoracic, 50 abdominal and 15 of the cerebrum. The time since wounding was stated to be 11·3 to 12·5 hours in the first two groups and 7·2 to 9·8 hours in the others. The dosage varied from 25 mg. for thoracic to 29 mg. for abdominal cases. The latest dose varied from 19·5 mg. to those with soft tissue wounds to 25 mg. to the abdominal cases; the delay time being respectively 4·8 and 7·2 hours.

Enquiry showed that:

69 patients or 32·1 per cent	had no pain.
55 patients or 25·6 per cent	slight pain.
40 patients or 18·6 per cent	moderate pain.
51 patients or 23·7 per cent	bad pain.

Total 215

100·0 per cent

A close parallelism existed in the number wanting pain-relief and those reporting bad pain.

Bad pain reported:

Yes ...	51 cases or 23·7 per cent
No ...	164 cases or 76·3 per cent

Pain relief therapy wanted:

Yes ...	58 cases or 27·0 per cent
No ...	157 cases or 73·0 per cent

Of the 51 patients who reported bad pain, 5 had no morphine and the other 46 an average of 24·5 mg. for the most recent dose.

It is suggested that morphine is all too often given indiscriminately and without adequate reason in the belief that severe wounds are inevitably associated with pain and/or used for symptoms other than pain. We suggest and will be most grateful for comments on or criticism of these conclusions by any who have collected data from British casualties.

Similarly the prevailing use of morphine in shock is also based on an erroneous concept. On examination of the various actions of morphine, even in moderate doses, on arterial circulation, capillary flow, peripheral circulation, blood pressure, on the medullary centre and spinal functions, on the production of nausea, vomiting and fainting, on oxygen consumption and CO₂ output—all in fact aggravate existing shock.

Severely wounded men undoubtedly have some degree of shock even though no symptoms are readily obvious and, even though such cases are not prone to complain of pain, repeated doses may not be absorbed at once and, accumulating and being absorbed simultaneously at a later stage, may produce morphine poisoning. The exhibition of morphine may too have a material effect on the amount and type of anæsthetic which such cases can subsequently take.

It is also stated that although unquestionably morphine is of value in severe pain no more than 10 to 15 mg. should be given, the optimum choice being 10 mg. given intravenously for immediate action.

Those who have personal or close experience in the field of or with wounds will remember or may have recorded observations on such cases that in fact the first effect is one on stunning surprise and mental shock without pain, pain developing at much later stages after movement of fractures or œdema and infection of soft tissues, have set in.

The invariable exhibition of morphine to severely wounded, or in fact to all wounded, would thus appear to be wrong, if this action is based on the supposition that pain is always present and doubly wrong in view of its effects on shock. For treatment of wounds in the field the use of morphine should in fact be governed by the condition of the wound and the patient at the time and by a real knowledge of its action as advocated long ago by Osler.

II.—WAR DIARIES

EMPHASIS in Services medical training at present is focused to a considerable extent, and very rightly so, on *Health Discipline* and all that that covers; but the Services medical training is a many faceted jewel and some of those facets tend to be forgotten or overlooked in the struggle to fit all the necessary subjects into allotted periods of training or squeeze between a multiplicity of duties. The duty and art of writing the War Diary of the unit under our command is often one of the forgotten facets.

As the last war period recedes, the numbers of those versed in the art, annoyance and obligation of producing something in the way of a War Diary diminishes: the number of those in the Services to whom the War Diary is a sealed book or a vague threat of future active service increases. It is with a plea for some instruction in this art to be included in the relative training programmes that this subject is now raised. Let at least some passing mention be made or the attention of the aspiring would-be-unit-commander be drawn to the fact that there are such things as War Diaries and the methods by which these are kept.

F.S.R. devotes nearly two valuable pages to this Art of War and the appropriate Army Form (A.F.C.2119) gives quite reasonably clear and explicit instruction as to how the Diary of the Unit or the formation under command should be compiled. And yet, a perusal of a few or even the many War

Diaries of the last war shows equally clearly that either little heed was paid to this art, or knowledge of the art was lacking in our unit commanders, or possibly that time was too precious and all absorbed in other duties.

It is quite true that in the stress of retreat, in the heat of battle, or in the boredom of inactivity it may be difficult to find time to spare. But, none the less, it is one of the jobs, and an important job of the Unit Commander or of the A.D.M.S. or even D.D.M.S. (or his devoted D.A.D.M.S.) to produce a War Diary which will be of real use to faraway Headquarters, to Medical Directorates and even to the Director-General.

F.S.R. and the instructions given in and on A.F.C.2119 are quite clear and easy to follow, even by commanders of average intelligence. The document has to be in duplicate; it is secret; its object is to furnish a historical record of operations and data upon which to base future improvements in Army training, equipment, organization and administration; if the appropriate forms are not available manuscript or made-up forms may be used, full instructions being available on the specimen copy which is included or should be included with the unit stationery; important points are carefully given to make compliance easy, such as: orders, messages, decisions, locations, movement, duties, detailed accounts of operations, nature of works, meteorological notes and a summary of information—the whole to be written up daily and initialled and finally signed once by the appropriate Commander.

In the deeper offices of A.M.D.2 there repose from the last war nearly 30,000 monthly War Diaries and nearly 2,000 quarterly reports. In how many of these are the precepts of F.S.R. and the careful instructions carried out? How many of these fulfilled their object of providing substance for future improvements in training, equipment, organization and administration? How many give details of operation through which the unit passed? How many give any meteorological details which are so much help to the thoughtful hygienist?

Precious few attain these objectives. Some are illegible, many are completely vague, many repeat daily trivial nonsense. And yet the individuals who composed these diaries must have had most valuable knowledge and experience. Let us take some samples:

A C.C.S. in the thick and brunt of the fighting in Syria has page after page with nothing but Beds occupied—Beds vacant—; no other information whatever.

A Field Ambulance Commander at Alamein who has distinguished himself many times since then, whose unit was in the very thick of it for two days and more reported: "The Unit has functioned normally for 36 hours."—Nothing more.

62 General Hospital bore the brunt of casualties in the siege of Tobruk which was relieved on December 10, 1941. Did the War Diary mention this event which stirred the whole Empire and the World? There was not a mention of the relief in the diary for December.

On the other hand an A.D.M.S. in Africa has given a detailed, lucid and valuable account of the medical aspects and lessons of the battle of Keren and a D.D.M.S. (since deceased) a careful and equally valuable medical account of the fierce campaign in Syria.

This, then, is the present plea that our modern military medical training should at least give some attention to an art which may prove of future value to many, the art of War Diaries.

Original Communications

TRAINING IN THE UNITED STATES ARMY MEDICAL DEPARTMENT

BY

Lieut.-Colonel J. M. MATHESON, O.B.E., M.D., M.R.C.P., F.R.C.S.Ed.,

Royal Army Medical Corps

Medical Liaison Officer with the Surgeon-General U.S. Army

THE best index of an army's readiness for war is the standard of its training both individual and collective. Each man must be trained to ensure that he will play an efficient and co-operative role in a team whatever its function. Teams must be trained to provide a concentrated and sustained effort to defeat the enemy. In its vital and indispensable role in an army organization the medical services must maintain in peace a body of men who are highly skilled in professional, technical and military duties.

The United States Army Medical Department is very conscious of its heavy responsibility and provides dynamic programmes and excellent facilities for the training of its officers and enlisted men.

One of the factors which has shaped the type of training given to U.S. Army Medical Corps officers in the post-war period has been the necessity to provide an attractive career by emphasizing professional training. This was possible as most pre-war regular officers had had extensive field experience during the war. Now, however, a good number of these officers have been rehabilitated in clinical work and many of them have qualified as specialists while junior officers have had extensive clinical experience and a carefully selected number have been given the opportunity to become specialists, indeed some have already received Specialty Board certification which corresponds roughly to obtaining higher qualifications in Britain.

As a further step in preparing regular officers to play their proper role in war additional instruction and practical opportunity will be provided in field responsibility as administrative and commanding officers. On commissioning, officers will receive a basic course in military medicine at the Medical Field Service School, Fort Sam Houston, Texas, and the Army Medical Research and Graduate School, Washington, D.C., followed by two years' field experience. Other officers, including those more experienced, will be brought up to date with an advanced course at the Medical Field Service School. Courses at schools of other arms and services, at the Command and General Staff College, the National War College, etc., will also provide medical officers with an interesting and wide

scope of training which will fit them to carry out their responsibilities as Army medical officers. In fact, the concept of military medicine as a close integration of medical and military sciences without prejudice to either is slowly being achieved by a carefully co-ordinated pattern of training.

The planning and supervision of the training of regular and reserve officers and enlisted men in the U.S. Army Medical Department is in the hands of the Education and Training Division of the Surgeon-General's Office. Training courses are not casual episodes but are intimately co-ordinated with the career pattern of the officer and enlisted man. Modern developments in the wide field of medical science create a challenge to those who plan military medical training and to meet it the closest co-operation is maintained with military and medical centres of research and education. Constant contact is maintained with civilian medical and educational bodies. Training programmes are subject to continued critical appraisal to ensure that in the light of modern developments the Army officer or enlisted man will be justly proud of his proficiency. Systematic instruction is given in two well-equipped schools, The Medical Field Service School, Fort Sam Houston, Texas, and the Army Medical Research and Graduate School, Washington, D.C., as well as in four large military teaching hospitals. Instruction comprises lectures and demonstrations with the liberal use of audio-visual aids, discussions, and by means of individual and group performance, emphasis being placed on reasoning rather than memory. Instructors are carefully selected on the basis of their personality, experience and teaching ability. Above all there prevails a spirit of infectious enthusiasm which, with carefully planned curricula, prevents training from becoming dreary or monotonous.

In the following article Colonel F. L. Wergeland, Chief of the Surgeon-General's Education and Training Division, describes concisely the scope of training in the U.S. Army Medical Department. In doing so he is dealing with a subject which has been his main interest most of his Service career and in which he shares with his Surgeon-General a progressive outlook.

Colonel Wergeland is a native of Montana who received his M.D. in 1932 in sunny California where he also did his internship before being commissioned in the regular Army Medical Corps. He graduated in 1935 from the Medical Field Service School, in 1938 from the Infantry School, Fort Benning, Georgia, and in 1941 from the Command and General Staff College. Apart from some two years (1946-48) as Senior Medical Adviser to the Joint U.S. Military Advisory Group to the Republic of China, most of his service has been concerned with training. In 1936-37 he was Chief of Professional Services, Fort McClellan, Alabama, in 1938-41 on the Staff of the Medical Field Service School after which he became Director of Organization and Training and Executive Officer at the Medical Replacement Training Center, Camp Barkeley, Texas. Since 1944, excluding his two years in China, he has been Chief of the Surgeon-General's Education and Training Division and has seen many changes take place in that time.

U.S. ARMY MEDICAL DEPARTMENT TRAINING ACTIVITIES

BY

Colonel F. L. WERGELAND, M.C.

*Chief of the Surgeon-General's Education and Training Division,
United States Army Medical Department*

MEDICAL Department training in the U.S. Army today presents, at first glance, a rather complex picture. This complexity developed during World War II with the need for more and more specialized personnel to support the modern Army. From the comparatively simple training structure of pre-war years there has been developed a system of education and training for military medical personnel which reaches into almost every Medical Department activity.

Medical Department training—like all military training—is divided into two phases. The first is *individual* training, where personnel receive the neces-



sary basic and technical training to enable them to function as parts of the medical team, and the second is *unit* training, where the individuals learn to operate as part of a medical unit of the Army.

This article will not attempt to cover all phases of medical training in the U.S. Army. Some training activities have been discussed in the article on Career Management. Articles to follow will cover the Medical Field Service School and Field Training of Medical Units. This article, then, will deal only with the *individual* training of Medical Department personnel, and will attempt to give a general picture of the many educational activities aimed at increasing the professional and technical efficiency of the individuals who make up the medical team.

Education and training for Medical Department personnel has three objectives. The first is to maintain the highest possible level of health in the Army, to be achieved by supplying adequate personnel who are qualified according to the best possible standards. The second is to provide continuous opportunities whereby all Medical Department personnel may increase both their theoretical and their practical knowledge. The third objective is to establish a cadre of qualified instructors in all fields of Medical Department activity who can perform the dual job of educating personnel for normal Army requirements, and of training reserve personnel who can be rapidly mobilized in the event of a national emergency.

The constant operation of a varied but well-integrated training program is necessary to accomplish these objectives. The Keystone of this program is the U.S. Army Medical Field Service School at Fort Sam Houston, Texas. Here are conducted the Basic and Advanced Courses for Medical Department officers of all Corps. Here, also are conducted the technicians' courses for enlisted men, the Warrant Officers' Preparatory Course, and many other courses for officer and enlisted personnel. In all, more than thirty separate courses are conducted at the Medical Field Service School.

In addition to the Medical Field Service School, much education and research is carried out at all Army hospitals throughout the country and overseas. In selected cases, Army instruction is supplemented by education in civilian institutions.

Education and training are conducted according to the needs of each individual Corps within the Medical Department. Some of the programs now in operation which characterize the training structure are summarized below:

Enlisted Personnel.—The enlisted personnel of the Medical Department had their forerunners in a small group of hospital stewards, designated by the Army in 1856 "not to exceed one for each military post, the said hospital stewards to be mustered and paid on hospital master rolls, as non-commissioned staff officers, with the rank, pay, and emoluments of a sergeant of ordnance, and to be permanently attached to the medical and hospital department, under such regulations as shall be prescribed by the Secretary of War."

In 1887 the "Hospital Corps" was established and permanently attached to

the Medical Department. Three years later it entered its first military engagement, evacuating troops suffering Indian tomahawk wounds at the Battle of Wounded Knee Creek on the plains of South Dakota.

At the beginning of World War I, 6,619 enlisted men were on duty in the Army Medical Department; and at the peak of that war, approximately 281,000. At the peak of World War II, there were 586,000. The enlisted force of the Medical Department now is recruited at the rate of $5\frac{1}{2}$ for each 1,000 authorized strength of the Regular Army. Where the Act of 1887 provided for only three classifications, twenty-nine technical specialties now are included, covering a wide variety of skills of which electro-encephalographers, dental assistants, meat and dairy hygienists, medical equipment repairmen, orthopedic mechanics, and psychiatric technicians are only a few.

To facilitate training and promotion, the Army Medical Department recently approved a streamlined career program for enlisted personnel. Candidates for this program are carefully screened, with full consideration given to the recruit's choice of work, as well as to his aptitudes. Training of these enlisted specialists is conducted at the Medical Field Service School and at a few other medical installations. Standards are high and training is thorough. Formal training is supplemented by continuous on-the-job training throughout the soldiers' career.

Officer Personnel.—The growing emphasis on specialization and the increasing complexity of modern military medicine is well illustrated by a simple enumeration of the various officer Corps of the U.S. Army Medical Department. These now consist of the Medical Corps, Dental Corps, Veterinary Corps, Army Nurse Corps, Women's Medical Specialist Corps, and Medical Service Corps. Following is a brief description of the education and training activities within each of these Corps.

Medical Corps.—It was with a full appreciation of the necessity for technical preparedness that, at the end of World War II, the Surgeon-General inaugurated a long-range programme of professional education for Army doctors. Certain sound considerations motivated this program. First, there was the military requirement for a Corps of professionally qualified Regular Army officers who would be fully capable of serving as a firm framework around which a rapidly expanded medical service could be built in time of mobilization. Next was the shortage of personnel. The post-war Army was almost five times pre-war strength, yet in 1946 there remained in the Regular Army Medical Corps only about half the number of officers as before the war. These men were well qualified in the military aspects of medical practice by virtue of their tactical and administrative assignments, but they had been unable to keep abreast of professional advances.

Thirdly, the principle of career planning was accepted in military personnel management and made it imperative that there be available to young officers of the Medical Corps a progressive and definite system of professional education and advancement by which they could forecast and carry out a balanced, satisfying career in military medicine.

The educational program which has been evolved from these requirements can be broken down into three main categories. These are: the *internship* program, the *residency* program, and *civilian institution training*.

The Military Internship Program is traditionally the most effective single instrument for obtaining Regular Army Medical Corps officers in the grade of First Lieutenant. Experience has shown that most of the participants in the internship program elect to remain in the Regular Army. In operation, selected medical school graduates are offered a one-year rotating internship in one of the Army general hospitals. During the year of internship, the individual is on active duty receiving the pay and allowances of a First Lieutenant, Medical Corps Reserve. Upon completion of the eight months' internship, the individual is eligible to apply for a commission in the Regular Army, which he can accept at the end of his internship year.

Military internship in Army hospitals was started again in 1947 with 25 medical school graduates entering training. At the present time, approximately 250 interns are selected each year. In addition to the military internships, a smaller scale programme of so-called "Civilian Internships" is operated by the U.S. Army. In this programme, the intern takes his training in a civilian hospital of his own choice, but during the intern year he is actually on active duty as a First Lieutenant, Medical Corps Reserve. At the end of the year, he goes to duty at an Army installation and must serve two years of compensatory service for the year of internship.

The Residency Program.—The residency program for training Medical Corps officers in the various medical professional specialties is a new program in the U.S. Army. The program was started in 1946 at several Army general hospitals. In this program, Medical Corps officers are offered residency training of from one to four years in one of 17 approved specialty programs. These programs range from anesthesiology to urology, all being inspected and approved by the Council on Medical Education and Hospitals of the American Medical Association, the American College of Surgeons and the various American Specialty Boards concerned.

Officers are selected for the residency program on the basis of individual interest and aptitude. Training is thorough and rigidly controlled to meet the requirements of the Army. Since its inception, over 600 Medical Corps officers have received residency type training in military hospitals. The residency program has proved very successful. It has stimulated a new interest in professional advancement among the older officers of the Regular Army. It has provided an incentive for the younger officers and has opened up challenging career fields for officers newly commissioned in the Medical Corps. In addition, the program has had a measurable effect in increasing the professional standards of the hospitals engaged in the training.

Civilian Institution Training.—Training in the Medical Department schools and in the various Army medical installations is not always adequate to fulfil all the requirements of the Army. This training is therefore supplemented by

use of civilian educational institutions for training of selected personnel. An example of the type of civilian education utilized by the Medical Department is Public Health. Each year a selected number of Medical Corps officers are sent to civilian medical colleges to take graduate work in the field of Public Health. This is done because it would be impracticable for the Army to offer a course of this length and nature for the small number of full-time officers required in this specialized field.

Medical Service Corps.—The relatively new Medical Service Corps provides commissioned officers in four broad fields. These are:

- (1) Pharmacy, Supply and Administration.
- (2) Sanitary Engineering.
- (3) Optometry.
- (4) Medical Allied Sciences.

A well-defined educational program is in operation for these officers—both military-wise and specialty-wise. The educational planning for the entire Corps is constantly expanding to meet the needs of the Service.

Officers in the fields listed above obtain their training primarily in civilian institutions prior to being commissioned. At the present time practically all officers being commissioned in the Medical Service Corps of the Regular Army are required to have at least a baccalaureate degree in their specialty field from a recognized school. Graduate training in civilian institutions is provided for a limited number of this Corps in Pharmacy, Medical Allied Sciences, Sanitary Engineering, and in various phases of administration, including hospital business, personnel and supply administration. In-service training is provided in supply procedure, medical equipment maintenance, and hospital administration.

In 1947 a Hospital Administration career pattern was developed for Army Medical Department officers. Because of the shortage of Medical Corps officers, an ever-increasing number of administrative positions were open to the members of the Medical Service Corps. To meet the immediate resultant need for training, a twelve-week course of instruction was established at the Medical Field Service School. That represented the first step toward formalized hospital administrative education. After two classes, the course was lengthened to twenty weeks and planning was started on a long course which would compare favorably with the university courses in civilian institutions. The last class of the twenty-week course graduated in December 1949. A total of 63 Medical Service Corps officers have been trained since its inception. In September 1950 the first ten-month course will be inaugurated at the Medical Field Service School. This course of instruction reflects the latest in hospital management and the new administrative structure of Army hospitals and it is as soundly conceived an educational program as can possibly be developed.

Dental Corps.—Following the cessation of hostilities, an expanded dental training program was formulated. Two courses are mandatory: the Basic and Advanced Branch Courses. Selected officers attend a course in advanced

dentistry. Outstanding qualified officers may attend the Command and General Staff School, Armed Forces Staff College, National War College, and Industrial College of the Armed Forces depending on quotas available to the Surgeon-General.

Opportunities for instruction in civilian institutions are afforded on a limited scale. Instruction is offered in recognised clinics, institutes, research laboratories and foundations to qualified personnel on the basis of the needs of the Corps. Dental internships in Army general hospitals are offered to selected graduates of dental schools on the same basis as medical internships described above.

Veterinary Corps.—This Corps performs a dual task: Chiefly food technology and to a small but important degree the care and treatment of animals. Recent developments in both fields have necessitated the formulation and implementation of a comprehensive training plan to be carried out both in Army schools and in civilian institutions. Following the mandatory Basic Branch Course, which is succeeded by further instruction at the Medical Department Meat and Dairy Hygiene School, veterinary personnel are given a 2-phase Advanced Branch Course. All officers take the four-month tactical and administrative phase: selected officers will pursue the professional phase in Advanced Veterinary Medicine, Laboratory Medicine or Preventive Medicine given at the Army Medical Department Research and Graduate School. In addition, a small group will be trained in the Quarter-master Subsistence Course at the Foods and Container Institute for the Armed Forces in Chicago.

Women's Medical Specialist Corps.—Created by Congressional action on April 16, 1947, this Corps comprises Dietitians, Occupational Therapists and Physical Therapists. Completion of the eight weeks' Basic Training Course is required of all officers who have had no previous military service. On completion of several years of satisfactory experience, officers in the Women's Medical Specialist Corps Regular Army may apply for further training. Dietitians are offered courses leading to an advanced degree in Institution Management, Personnel Administration, and Nutrition. Physical Therapists and Occupational Therapists may apply for post-graduate professional training leading to an advanced degree in their specialty.

One-year training courses and advanced instructions up to nine months in Dietetics and in Physical Therapy are currently given at Brooke General Hospital and the Medical Field Service School. These courses are available to Reserve Officers who have expressed a desire to accept a Regular Army commission. Apprenticeships in Occupational Therapy, lasting from three to twelve months, are offered by the Medical Department. Beginning in 1950, the Medical Department conducts a ten-month internship in Occupational Therapy. Applicants selected for this internship will be tendered Reserve commissions. Following the completion of a two-month basic training course, they will be assigned to designated Army general hospitals for further experience, after which they will be expected to apply for commissions in the Regular Army.

Army Nurse Corps.—A comprehensive educational programme has recently

Courses in anesthesiology lasting thirteen months are provided in four Army general hospitals. Approximately 24 nurses can be trained annually, and those completing the course satisfactorily qualify for examination by the American Association of Nurse Anesthetists.

World War II gave us splendid experience upon which to develop a training program best suited to mobilization requirements. With the use of the individual training as mentioned above, and that which was conducted at our nine Medical Replacement Training Centers along with the establishment of a Medical Unit Training Center at the same locality, it was possible to have medical units organize and participate in preactivation training to try out individually trained personnel. Then the units could obtain individual replacements from the Replacement Centers before unit training and final training inspection and shipment overseas. The proximity of individual and unit training areas, the provision of early unit training cadres, the assignment of unit command and administrative personnel prior to activation, and the final com-

The diagram illustrates the career progression of an Indian Army officer. It begins with 'MEDICAL ROTC' and 'ARMY INTERNSHIP', leading to 'COMMISSION IN REGULAR ARMY'. From there, the path splits into 'BASIC BRANCH COURSE (M.F.S.S.)' and 'PROFESSIONAL TRAINING AT ARMY HOSPITALS'. The 'BASIC BRANCH COURSE' leads to 'ADVANCED BRANCH COURSE' (Tactical and Administrative Phases) and 'TRAINING IN CIVILIAN INSTITUTIONS'. The 'ADVANCED BRANCH COURSE' leads to 'COMMAND AND GENERAL STAFF COLLEGE', 'ARMED FORCES STAFF COLLEGE', 'NATIONAL WAR COLLEGE', and 'INDUSTRIAL COLLEGE'. The timeline at the bottom indicates 'FIRST YEAR' for the initial training, 'SECOND TO TWENTY-FIFTH YEAR' for the main career, and '25th YEAR TO RETIREMENT'.

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graph LR
    ROTC[MEDICAL ROTC] --> Intern[ARMY INTERNSHIP]
    Intern --> Commission((COMMISSION IN REGULAR ARMY))
    Commission --> Basic[BASIC BRANCH COURSE  
M.F.S.S.]
    Commission --> Hosp[PROFESSIONAL TRAINING  
AT ARMY HOSPITALS  
• RESIDENCIES  
• BASIC SCIENCES  
• SHORT COURSES]
    Basic -- "1st YEAR" --> Hosp
    Basic -- "DUTY" --> Adv[ADVANCED BRANCH COURSE  
TACTICAL AND ADMINISTRATIVE PHASE  
9 MONTHS  
1st YEAR]
    Hosp -- "1st YEAR" --> Adv
    Hosp -- "1st YEAR" --> Civil[TRAINING IN CIVILIAN INSTITUTIONS]
    Adv -- "1st YEAR" --> Civil
    Adv -- "1st YEAR" --> CGSC[COMMAND AND GENERAL STAFF COLLEGE  
7-15 YEARS]
    Adv -- "1st YEAR" --> AFSC[ARMED FORCES STAFF COLLEGE  
8-14 YEARS]
    Adv -- "1st YEAR" --> NWC[NATIONAL WAR COLLEGE  
10-20 YEARS]
    Adv -- "1st YEAR" --> IC[INDUSTRIAL COLLEGE  
10-25 YEARS]
    Civil -- "1st YEAR" --> CGSC
    Civil -- "1st YEAR" --> AFSC
    Civil -- "1st YEAR" --> NWC
    Civil -- "1st YEAR" --> IC
    CGSC -- "DUTY" --> Ret[25th YEAR TO RETIREMENT]
    AFSC -- "DUTY" --> Ret
    NWC -- "DUTY" --> Ret
    IC -- "DUTY" --> Ret
  
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plete assignment of the remaining technical, administrative, and professional personnel upon the date of activation made it possible to have ideally trained medical units with a near-by source of trained medical personnel to meet last-minute needs of the respective unit.

Individual training and unit training together make up the team needed in time of war and we feel that we can quickly gear to preactivation type training for medical units if and whenever the need so indicates.

The structure of education and training of Medical Department personnel has been presented by giving a brief description of the training offered the various categories of personnel who make up the Medical Department. Unit training and field training will be made the subject of a subsequent article.

CUTANEOUS DIPHTHERIA

Epidemiological and Dermatological Aspects of 365 Cases amongst British Prisoners of War in the Far East

BY

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PRISONER-OF-WAR Camps boast an unenviable reputation for the production of virulent disease in epidemic form. This infamous and unhappy notoriety was in no way diminished by experience in the Far East during the recent war. It is, however, as pointed out by Livingood and his associates (1946), one of the compensations of war that an opportunity is afforded physicians to study certain diseases which tend to occur in epidemic proportions amongst military personnel. Such a disease they rightly count cutaneous diphtheria. My present paper deals with an outbreak of this disease of alarming proportions and peculiar design amongst British Prisoners of War in Japanese Camps on Singapore Island during the period February 15, 1942 to February 14, 1943.

It will hardly be necessary to point out that the circumstances of prisoner-of-war existence precluded any possibility of investigating the cases along the lines which I would have wished. Even the keeping of such records as were achieved was a difficult problem, for, as my notes on the increasing numbers of cases grew larger, the necessity to condense them ever further to reduce bulk and minimize the constant risk of summary confiscation became increasingly pressing. This unhappy circumstance, allied to our other difficulties, accounts for the failure to record much that might have proved of both interest and importance.¹ It was possible, however, to preserve certain data regarding epidemiological conditions, predisposing factors, the morphologic characteristics of the cutaneous lesions and their course. Brief reference will also be made to complications, but it is hoped to publish at a later date fuller details of the cardiovascular and neurological findings.

While the diagnosis and management of isolated cases of cutaneous diphtheria probably falls within the experience of an appreciable proportion of physicians in this country the development of extra-facial diphtherial lesions on an epidemic scale has been much less common. Indeed, so far as I am aware, only one small outbreak of cutaneous lesions has been described as occurring within the United Kingdom since 1749 when Starr reported

¹ Having seen, at a later date, the conditions at Changi and many other Prisoner of War camps on the Island and elsewhere, it is with appreciation of the difficulties and even risks involved and with admiration of the professional ability and tenacity which, in the face of completely unsympathetic Japanese control and interference, maintained these records, that we now most gratefully accept and publish this account.—Ed.

numbers of extra-faucial infections during an epidemic of the *angina maligna* in Cornwall. The outbreak in question is that of Williams (1943) who experienced in an epidemic of 37 cases of diphtheria amongst troops in England, 17 faucial infections, 1 anterior nasal case and 19 instances of cutaneous and/or conjunctival diphtheria. All other reported epidemics of cutaneous diphtheria appear to have been encountered in tropical or sub-tropical countries although outbreaks of true wound diphtheria have arisen not infrequently in temperate climates.

It may therefore be of interest, before proceeding to describe the epidemic which fell to my experience, to review briefly the history of extra-faucial diphtherial infections, particularly in so far as they have occurred in epidemic proportions. The history of non-respiratory localizations may be traced with certainty back to the 1700s, which century produced accounts of cutaneous diphtheria from Starr in Cornwall (1749), from Chomel in France (1759) and from Bard in New York (1771). Bretonneau (1821–1826) and Trousseau (1830–1835) both furnished extensive observations on the diagnosis and prevention of the disease and following their teaching cutaneous localizations became much less frequent. Neisser (1891) appears to have been the first observer to recover the organism from a cutaneous lesion, but it was not until the 1914–1918 War that reports on large series of extra-faucial infections began to appear. Craig (1919), reporting the results of his investigations into the ætiology of the desert or veldt sore, a major cause of sickness and disability afflicting our troops in the Middle East Theatre of War in 1914–1918, succeeded in obtaining positive cultures of the Klebs-Loeffler bacillus in 129 out of 197 cases (65·5 per cent). The work of Walshe (1917, 1918, *a* and *b*) in the field of post-diphtheritic paralysis confirmed Craig's fundamental findings and further support for these views derives from studies in the same territory during the recent war. (Cameron and Muir, 1942; Cameron, 1943; MacGibbon, 1943.) In the field of wound diphtheria World War I furnished reports on large numbers of cases. (Fitzgerald and Robertson, 1917; Simons, Wearn and Williams, 1921; Simmons and Bigelow, 1919; Hartsell and Morris, 1919; Landow, 1923.)

Between the two Great Wars only Bensted (1936), on the North-West Frontier of India, appears to have encountered an epidemic of extra-faucial localizations but the coming of the recent conflict saw a revival of the one-time considerable interest in cutaneous diphtheria in the literature, with reports from the Middle East Theatre of War on a total of 78 cases (Cameron and Muir, 1942; Cameron, 1943; MacGibbon, 1943), from Burma on 140 cases (Livingood *et al.*, 1946), and from the South Pacific on 174 patients (Liebow *et al.*, 1946).

EPIDEMIOLOGICAL CONDITIONS

The epidemic of diphtheria amongst the Prisoners of War on Singapore Island, which I now describe, remarkable though it proved to be in many respects, presented one feature which alone sufficed to set it aside as bizarre—

namely the occurrence of cutaneous diphtheritic lesions in 365 or 37·8 per cent of 964 cases of diphtheria. My account relates primarily to those 365 patients. The figures include all cases admitted to the Isolation Wards as diphtheria and accepted as such. It must, be emphasized that an unknown, possibly considerable number of mild, atypical cutaneous cases almost certainly pursued a clandestine existence. This doubtless also applied, although to a lesser extent, to mild nasal and faucial infections. In addition the Japanese might on occasion refuse the transfer of a case from outlying camps on the Island. Such cases were consequently lost from the record.

Numbers of my colleagues and fellow prisoners have written vividly and fully on life and conditions in Japanese Prison Camps. (Cruickshank, 1946; Burgess, 1946; Dunlop, 1946). It is therefore necessary to proffer here only the briefest account of the general background.

The men who were to be the victims of the sweeping ravages of so many virulent infections were taken prisoners during February 1942 after a short but difficult and disastrous campaign. Conditions in the main Camp at Changi and in other camps were little short of appalling. Overcrowding was of gross degree, some thirty-two thousand British and fifteen thousand Australian Troops being crammed into barracks designed to accommodate a British garrison of five or six thousand. Sanitation and water supplies presented grave difficulties. Bacillary dysentery quick to seize a unique opportunity rose most magnificently to the occasion, sweeping through the camp in a fury of destruction, to leave a population weakened and despoiled by its passage and fearful of its return.

The diet comprised the very poorest type of Asiatic fare. Grossly deficient in protein, fats, vitamin B₁ and the B₂ complex as it was, disaster seemed inevitable. Deficiency of other essential elements was considered probable but less significant. The gloomy predictions of our nutritionists were soon realized. Beri-beri in all its forms became common in May, June, July and August 1942, while B₂ complex deficiency reared its head mainly in July and August 1942, first in the form of angular stomatitis, glossitis and scrotal dermatitis but later as spastic paraplegia, retrobulbar neuritis and other so-called pellagroid syndromes. About October 1942 conditions began to improve somewhat and those deficiency syndromes although still prevalent, became for the time being rather less frequent and certainly less severe.

The grim spectre of diphtheria heralded its approach in soft but certain tones. Five cases of faucial diphtheria declared themselves during March 1942. From that point onwards the infection advanced steadily in ever-increasing strength. It was, however, not until July that a notable rise in the admission rate occurred. The following month the storm broke in all its fury. September saw the epidemic reach its peak with 295 admissions for all forms of diphtheria. The slight fall which occurred in October was succeeded by a rapid decline until February 1943 when the infection had receded to a more or less endemic state.

Recognition of cutaneous diphtheria in its acute stage was delayed until

August 1942, but once established it pursued a course roughly parallel to the main epidemic. The cutaneous localizations fell into two main and distinctive categories—scrotal diphtheria 167 cases, and cutaneous diphtheritic ulcerations 198 cases. The monthly admissions tabulated within these two essential categories are set out in Table I, p. 68, while the graph, p. 69, represents in diagrammatic form the progress of the epidemic.

The unfolding of the story of extra-faucial diphtheria can be most readily seen by reference to the table and graph. Perhaps the most significant epidemiological point is, that, although the table covers a period of one year no single case exhibiting an extra-faucial lesion was recognized during the first six months of this period which nevertheless produced 85 cases of pharyngeal and nasal diphtheria with nine deaths. It is, however, of note that as early as March 1942 Major P. R. Graves, R.A.M.C., O.C. Medical Division had recognised a case of post-diphtheritic paresis presenting in which the only causal lesion appeared to be a cutaneous one. 4 other such cases emerged in April and July. I am indebted to Major Graves for the following notes on these 5 cases. "Blurring of vision occurred in 3 cases; weakness and hoarseness of the voice in two cases; a transient left facial paresis in one case and typical peripheral neuritis in all 5 cases." The original cutaneous lesions had been diagnosed "ulcerative dermatitis," in 3 cases; "infected traumatic wound" in 1 case; and "infected burns" in 1 case.

These observations are useful in permitting at least a tentative reconstruction of the epidemiological sequence. First came a phase of virulent faucial diphtheria associated no doubt with a steep rise in the carrier rate. During this phase cutaneous cases were not recognized although their clandestine occurrence in atypical forms is evidenced by the 5 cases of post-diphtheritic paresis presenting which subsequently emerged. There followed a phase of peak prevalence for both respiratory and non-respiratory infections, the latter being of such a nature and such severity as to compel recognition of their true ætiology. The increased prevalence of the pure pharyngeal infection in this phase was, as might be anticipated, linked with a notable fall in the case fatality rate in this type of case from 10·38 per cent for the first five months to 4·6 per cent for the next three months. The third and final phase was of course that of declining prevalence and virulence.

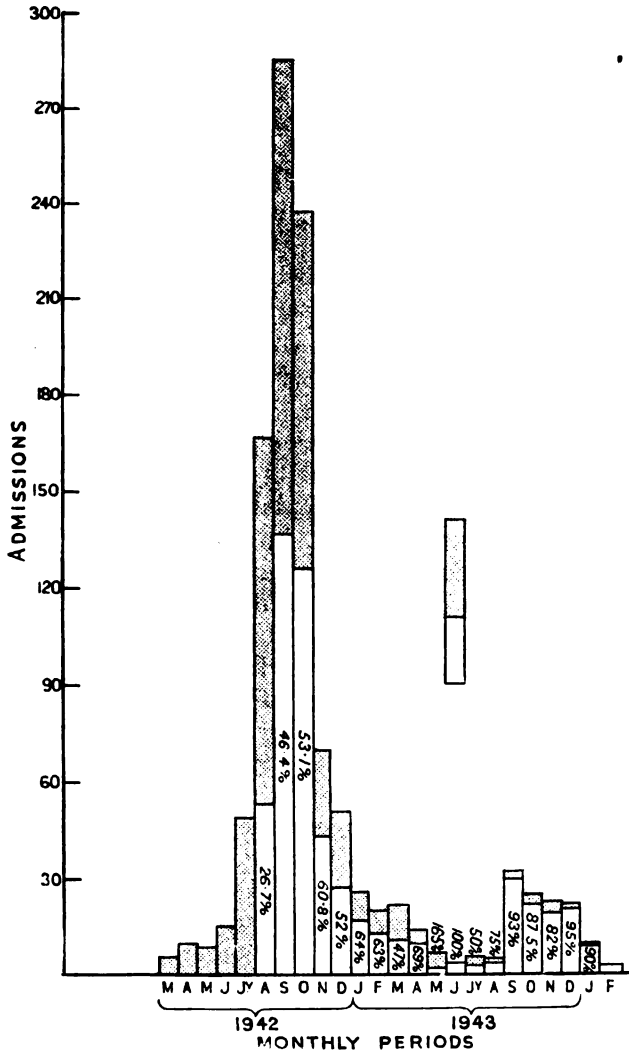
That large-scale epidemics of extra-faucial diphtherial lesions have tended to appear chiefly after the establishment of an even more extensive outbreak of respiratory localizations is neither a new nor a recent observation. This train of events is to be traced in the epidemics of Craig (1919), Cameron and Muir (1942) and Williams (1943), in all of which the cutaneous cases were associated with considerable numbers of faucial and nasal infections. This sequence is, however, strikingly absent in the epidemics encountered in Burma (Livingwood *et al.*, 1946) and in the South Pacific (Liebow *et al.*, 1946). In both these outbreaks the local native population is indicted as the reservoir of infection.

Nevertheless civilian experience affords ample evidence that wide dissemina-

TABLE I.—MONTHLY ADMISSIONS FOR DIPHThERIA FEBRUARY 15, 1942 TO FEBRUARY 14, 1943
BRITISH IMPERIAL FORCES

Month	Pure scrotal ulcers	Scrotal and nasal ulcers	Scrotal and faucial ulcers	Scrotal and labial ulcers	Pure ulcers	Cutaneous diphtheritic ulcers and nasal ulcers	Ulcers and faucial ulcers	Deaths	Labial, nasal, faucial and post- diph. paresis presenting, etc., etc.	Cases	Totals	Deaths		
½ Feb.	—	—	—	—	—	—	—	—	—	—	—	—		
Mar.	—	—	—	—	—	—	—	—	5	5	2	2		
Apr.	—	—	—	—	—	—	—	—	9	9	—	—		
May	—	—	—	—	—	—	—	—	8	8	—	—		
June	—	—	—	—	—	—	—	—	15	15	3	3		
July	—	—	—	—	—	—	—	—	48	48	4	4		
Aug.	19	8	5	—	11	—	1	1	149	194	9	11		
Sept.	53	6	18	7	4	7	31	2	173	295	6	15		
Oct.	22	3	10	3	1	3	69	1	124	237	10	14		
Nov.	—	—	—	2	—	1	38	1	28	69	1	2		
Dec.	3	—	—	—	—	—	20	1	25	50	—	—		
Jan.	2	—	—	—	—	—	12	—	10	24	—	—		
½ Feb.	—	—	—	—	—	5	—	—	5	10	—	—		
Totals	99	10	36	17	5	12	186	3	7	2	4	35	964	51*
Total Cases	167										198		599	964

* Plus three deaths not attributable to diphtheria.



tion of the specific organism of diphtheria will rarely in itself suffice to precipitate large numbers of extra-faecal cases in a European population containing a suitable proportion of non-immunes. Other factors must also be at work. Most important amongst these factors is undoubtedly the integrity of the cutaneous surface. Trousseau first enunciated the dogma that diphtheria never "developed itself on the skin unless it was previously deprived of its epidermis or ulcerated." Craig (1919) expresses the view that "The common occurrences of diphtheritic skin lesions under tropical conditions may be explained:

- "(a) by moistness of the skin and activity of the sweat glands, soddenness of epithelium providing an opportunity for entrance of bacilli and a suitable medium for their multiplication.

“(b) by the environment of the troops—close contact between man and man, lack of washing facilities and constant liability to laceration of the skin.”

Livingood and his associates (1946) considered that the following conditions must be operative in order to produce an *epidemic* of cutaneous diphtheria:

- (1) A significant proportion of susceptibles.
- (2) A hot humid climate or a desert climate.
- (3) A source of infection.
- (4) A combination of circumstances which makes for multiple superficial traumata to the skin, poor personal hygiene and close personal contact.

With these views my experience was wholly in accord, although I would insist that more than a source of infection is necessary but rather a *reservoir* of infection whether this be a concurrent outbreak of respiratory diphtheria or a widespread prevalence of cutaneous diphtherial lesions in local native populations. The various and complex predisposing factors detailed in (4) above really amount in aggregate to a peculiarly vicious environment likely to arise only amongst personnel engaged in active field combat or placed in circumstances of grave destitution, waging an incessant fight with squalor, filth, hopelessness and degradation in tropical and sub-tropical climates.

On no occasion was I able to establish that the specific virus of diphtheria had breached the intact unabraded skin which apparently presented an insuperable barrier to the disease. The predisposing lesions proved to be of diverse origin and their nature is fully discussed in relation to the various localizations of the membrane.

It is necessary to point out, however, that Cameron and Muir (1942), differentiating their cases into acute and chronic sores, found the former variety always associated with a positive lesion of the throat or more commonly the nose occurring both on unbroken skin and at the sites of previous trauma. The chronic sore on the other hand they found to be invariably superimposed on a pre-existing skin lesion. Livingood (1946) also admits that a significant percentage of patients did not give a history of a perceptible pre-existing lesion. It would therefore appear that attack on the unabraded skin may at times succeed.

The part played in the spread of these infections by improper technique in carrying out dressings at Unit Medical Inspection Rooms was difficult to assess. It is an aspect heavily underlined by Bensted (1936). Under prisoner-of-war conditions, shortage of antiseptics and difficulties in sterilization render it hard to ensure that all necessary precautions are rigidly followed. Many extra-faucial lesions must have been clandestine, thereby providing a most dangerous source of infection.

The population at risk in the Camps lay very largely in the age-group 20–25 years. Such a population might, according to Topley and Wilson (1931), be expected to contain 11–12 per cent of Schick-positive reactors. On the other hand Bensted (1936) found 27 per cent of non-immunes amongst a battalion of troops. In this connexion it is to be borne in mind that con-

gregations of troops, especially County Regiments, are likely to contain a considerable proportion of men from rural areas, which might well result in an usually high percentage of Schick-positive reactors in relation to age. It is not without interest that, when in December 1943, by which time diphtheria had all but disappeared, I was able to carry out Schick tests on 50 prisoners of war selected at random, 46 were negative and 4 were very faintly positive. Those 4 were rapidly converted to the Schick-negative state by a single dose (1 c.c.) of toxoid antitoxin floccules. The absence of a single well-marked positive reactor even in so small a series of 50 tests and the promptness of the response to a single dose of toxoid in the mild positives might at least be considered to give some credence to the concept that the infection spent itself by the method of almost total exhaustion of susceptibles in a relatively closed community.

The size of our population I could not accurately record from day to day. At the commencement of our captivity the British prisoners numbered approximately 32,000 but from that point onwards this figure was subjected to continual increases and decreases as parties of troops were moved in or were despatched to Camps on the Mainland of Malaya and Burma. As departures were in excess, the numbers of men had fallen by about one-half in February 1943. No doubt this circulation of population was not unimportant in maintaining the epidemic pot boiling. During 1943, although emigration continued, immigration almost ceased so that our community became a relatively closed one.

Diphtheria in Malaya is a rare disease. Accordingly when, in July 1942, the care of these cases became my responsibility an attempt to trace the beginnings of the epidemic was made. After a lapse of three and half months the necessary information was somewhat difficult to obtain, but the finger of suspicion pointed relentlessly to an English County Regiment which had landed in Singapore from England at the end of January 1942. All the early cases occurred in this unit or its immediate contacts. It is a far cry from the shores of England to prisoner-of-war camps in Malaya, but it is more than a little probable that the infection successfully negotiated a journey of some 11,000 miles to unfold its deadly potentialities.

BACTERIOLOGY

Any consideration of cutaneous diphtheria must hinge largely on diagnostic criteria and here it was that the greatest obstacles to proper study of the cases lay. Our diagnostic armamentarium boasted:

- (1) Direct Smears: The limited potentialities of this method were well recognized and it was employed very rarely.
- (2) Culture: As we did not possess the usual media, Major Roy Maynard, Australian Army Medical Corps, employed a medium comprising agar enriched with egg albumen, peptone and serum. An excellent growth was obtained although rarely in pure culture and the organism readily identified. Identification was in all cases by skilled bacteriologists. In

a considerable proportion of cases, the morphology of the organisms isolated suggested a gravis strain but it was not possible to pursue this line of investigation.

For the purpose of virulence tests we possessed no suitable experimental animal. The only animal which we were in a position to consider was the rat and the relative immunity of this creature has been amply confirmed (Topley and Wilson, 1931). Virulence tests being beyond our resources, this attribute of the organism must be inferred from the mortality, the incidence of myocarditis and the incidence of paresis. Notwithstanding the lack of animal inoculation as tests of virulence the evidence indicates beyond all reasonable doubt the existence of a large number of extra-faucial lesions actively infected with virulent strains of the *Corynebacterium diphtheriæ*.

These then were the general principles upon which diagnosis was based. It is necessary to emphasize that there existed in every case a local lesion on which there was implanted a highly probable diphtheritic infection. It will be realized that with increasing experience the clinical appearance of these lesions acquired an increasing diagnostic significance. On the bacteriological side, amongst the 167 cases of scrotal diphtheria a positive culture for the *Corynebacterium diphtheriæ* was obtained in 125 instances (74·8 per cent). In one case cultures were repeatedly negative but the diagnosis was maintained and the case subsequently died. In 41 cases no cultures were taken. Of those, 8 died and 12 developed evidence of the cardiovascular and neurological complications peculiar to diphtheria. In the 68 scrotal cases exhibiting a second diphtherial localization positive cultures were obtained from this lesion in 44 examples: lips 3 cases, nose 26 cases, fauces 8 cases, cutaneous diphtheritic ulceration 7 cases.

TABLE II.—BACTERIOLOGICAL RESULTS IN SCROTAL CASES

<i>Type of case</i>	<i>No. of cases</i>	<i>Culture positive</i>	<i>Culture negative or omitted</i>
Pure scrotal diphtheria	99	88	11
Scrotal and nasal diphtheria	36	Scrotum	19
		Nose	26
Scrotal and faucial diphtheria	17	Scrotum	7
		Fauces	8
Scrotal and labial diphtheria	5	Scrotum	4
		Lips	3
Scrotal and ulcers	10	Scrotum	7
		Ulcers	7
Totals	167	Scrotum	125
		Other	
		localizations	44
			42
			24

Amongst the 198 cases exhibiting cutaneous diphtheritic ulcerations a positive culture for the *Corynebacterium diphtheriæ* was obtained in 156 cases while in 10 further cases direct smears were reported positive. Bacteriological

confirmation was thus forthcoming in a proportion of 83·8 per cent of cases in this category. In the 12 cases of cutaneous diphtheritic ulceration with additional localizations confirmatory culture was forthcoming from the second lesion in 8 cases—nasal 2; faucial 5; labial 1.

TABLE III.—BACTERIOLOGICAL RESULTS IN CUTANEOUS DIPHThERITIC ULCERATIONS

<i>Type of case</i>	<i>No. of cases</i>	<i>Culture positive</i>	<i>Culture negative or omitted</i>
Pure cutaneous diphtheritic ulceration	186	147 (plus 10 positive on direct smear)	29
Cutaneous diphtheritic ulceration and nasal diphtheria	3	Ulcers 3 Nose 2	— 1
Cutaneous diphtheritic ulceration and faucial diphtheria	7	Ulcers 6 Fauces 5	1 2
Cutaneous diphtheritic ulceration and labial diphtheria	2	Ulcers — Lips 1	2 1
Totals	198	Ulcers 156 + 10 Other localizations 8	32 4

Thus in 365 cases exhibiting a cutaneous diphtherial localization the specific infection was corroborated by the bacteriologist in no less than 291 instances (79·7 per cent). In 74 cases culture was either omitted or reported negative but of those no less than 9 died and a further 12 developed evidence of the cardiovascular and neurological complications peculiar to diphtheria.

The ease with which a positive culture was obtained varied somewhat in the different types of case. In scrotal diphtheria a positive report was very frequently forthcoming at the first attempt and generally, with the rarest of exceptions, the organism could be found in not more than three successive attempts. In the cutaneous ulcer case the position was somewhat different. Repeated cultures were frequently necessary and one or two negative reports were of little significance. This was particularly so where the lesion was fairly old or where antiseptic dressings had been applied. However, a saline dressing for a few days did not retard progress and a positive result could usually then be achieved. In addition it was quite futile to take swabs from the surface of these ulcers—the swab must be insinuated into the depths if a true result is sought.

SCROTAL DIPHThERIA

Encountering scrotal diphtheria for the first time I had thought that I was dealing with a previously unknown localization—this is, however, not so. Amongst the earlier writers Trousseau (1830) has described instances of the characteristic membrane appearing on excoriations of the scrotum. In more recent times Martin (1928) reports a case in which pure cultures of the diphtheria bacillus (and positive virulence tests) were obtained from an abscess of the tunica vaginalis, while Cameron and Muir (1942) illustrate an acute

diphtheritic scrotal ulcer—in this instance an acute contact infection of the previously unabraded skin of the right side of the scrotum exactly opposite a lesion on the right thigh.

Gangrene of the scrotum is a somewhat rare condition, the bacteriology of which presents a very variegated picture (Dodson, 1944). Nevertheless I have been unable to discover a single instance of this dreadful condition in which the *Corynebacterium diphtheriæ* was indicted as the causal agent. Diphtheritic vulvo-vaginitis is a not uncommon clinical entity and numerous references to it are to be found in the literature.

It is therefore clear that a peculiar combination of circumstances, environmental and individual, not normally likely to arise, created conditions unusually favourable to an attack on a tissue not previously susceptible to the ravages of diphtheria—namely the scrotal skin. The epidemic was marked by no less than 167 instances of diphtheria of the scrotal integument. In 99 cases the scrotal disease occurred in the absence of clinical signs of involvement of the nose and/or throat; in 10 instances there was associated cutaneous diphtheritic ulceration elsewhere on the body; in 53 examples associated nasal, faucial or naso-faucial diphtheria was present; and in 5 cases labial diphtheria co-existed (Table IV).

TABLE IV.—MONTHLY ADMISSIONS — SCROTAL DIPHThERIA

Month	Pure scrotal		Scrotal and labial		Scrotal and ulcers		Scrotal and faucial: nasal, etc.		Totals	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Aug.	19	—	—	—	1	—	13	1	33	1
Sept.	53	1	4	—	6	1	25	5	88	7
Oct.	22	—	1	—	3	—	13	3	39	3
Nov.	—	—	—	—	—	—	2	1	2	1
Dec.	3	—	—	—	—	—	—	—	3	—
Jan.	2	—	—	—	—	—	—	—	2	—
Totals	99	1	5	—	10	1	53	10	167	12

As has already been discussed explosive and extensive epidemics of cutaneous diphtherial lesions appear to depend on at least a number of associated circumstances. Extensive dissemination of virulent strains of the *Corynebacterium diphtheriæ* linked with peculiarly vicious environmental conditions seemingly constitutes the necessary setting, but the actual precipitation of an epidemic evidently depends on the existence of suitable predisposing skin lesions. In other recorded epidemics strict specificity of such predisposing skin lesions has not been an outstanding feature but in scrotal diphtheria the preliminary breach of epidermal continuity was of unvarying constancy in its origin.

The way to infection of the scrotal skin in every case lay through the open door provided by the condition of scrotal dermatitis. Without doubt this cutaneous disorder explains the great numbers of a remarkable and distressing diphtherial localization. The syndrome represented by angular stomatitis, glossitis, and scrotal dermatitis is generally accepted at the present time as a

manifestation of B₂ complex deficiency and more particularly of riboflavin insufficiency. The hyporiboflavinosis triad was extremely common amongst the prisoners during July, August, September and October 1942 (Burgess, 1946). Indeed, in my own experience quite a small proportion of the prisoners failed to present the stigmata of the triad in some degree if carefully sought during this period. During these selfsame months the outbreak of scrotal diphtheria ran its main course. I have no shadow of doubt that the great numbers of scrotal infections amongst the prisoners can, in the final reckoning, be traced to deficiency of riboflavin in the diet.

The scrotal part of the syndrome was represented in the first instance by an erythematous, extremely itchy and irritable, dry, scaly and rugose condition of the scrotal skin. There followed, especially if chafing aggravated affairs, a very red, superficial, eczematous dermatitis which finally deteriorated to a moist weeping state with profuse sticky discharge. It was at this point that infection with the *Corynebacterium diphtheriae* appeared to occur.

The advent of the diphtheritic infection almost invariably ushered itself in with a notable increase in pain and discomfort. Accurate assessment of the incubation period proved difficult but no definite indication that it might differ materially from the well-established figures for faucal cases was forthcoming. An explanation of the increased pain was not long wanting, for within a few hours the scrotal skin and subcutaneous tissue were seen to be the seat of an acute, rapidly spreading inflammatory process. The most noteworthy feature of this inflammation was an extraordinary thickening of the scrotal integument due to widespread infiltration with inflammatory oedema fluid. In consequence, the scrotum presented a rather curious appearance and texture somewhat like an exceedingly thick, rubbery, partially distended balloon. The scrotal contents appeared to escape entirely and no effusion into the tunica vaginalis was detected. Oedema of the prepuce was an associated phenomenon in many cases but otherwise the swelling was confined to the scrotum.

Coincident with this inflammatory oedema, in the pure scrotal case where no other focus of diphtheria existed, the whole eczematous area of scrotal skin became covered with a thin, dry, brownish, adherent crust, within which crusted area a number of centres of more or less deep ulceration rapidly developed. These areas of ulceration were almost diagnostic, being in the majority of cases multiple, rarely greater than half an inch in diameter, punched out and quite deep. The ulcer floor was a very typical yellowish white or grey, soft, rather exudative but firmly adherent membrane highly reminiscent of the faucial lesion. The ulcerated areas assumed all sorts of shapes but for some curious reason were frequently roughly triangular. Unusually the ulcers were larger, even attaining the size of a half-crown and quite exceptionally there was a single large ulcer. An atypical form seen in some half a dozen cases was a much more extensive but more superficial ulceration with beautiful serpiginous edge, covering half or more of the scrotum and lined throughout with the grey membrane.

Reaching their half-inch or occasionally greater size, the ulcers tended to

enter a limiting phase becoming more indolent with little tendency to extend and coalesce. A most disturbing feature, however, seen in about one-fifth of the cases, was the liability of the infection to creep outward and backward to reach the inner aspects of the thighs, the groins and the perineum. The occurrence of this unfortunate sequence was prone to end in ulceration of disturbingly deep order and in two cases we had several days of anxiety for the femoral artery. The penis too was liable, because of its position, to become involved in the process and a small focus of ulceration frequently developed on the prepuce.

A considerable degree of inguinal adenitis and peri-adenitis was to be expected but never to the remarkable extent of the typical "bull neck" of some faucial cases. The final picture was therefore one of a thick, balloon-like scrotum covered with a thin brownish crust, with perhaps half a dozen quite deep triangular ulcers lined with grey membrane. One of these ulcers located near the junction of scrotum and thigh might be tending to spread outwards to slough quite deeply in the superficial tissues of the thigh.

The unfolding of this sequence of events occupied a period varying from five to fourteen days but, remarkable though it may seem, failure to achieve control of the local lesion ultimately did not arise in one single case *provided there was no coincidental faucial or naso-faucial infection*. However, in 5 cases, control was achieved only after the resort to our minute and precious stocks of antitoxin. In the absence of serum but with complete rest, marmite and suitable local dressings, the spread of infection and ulceration was ceasing as a rule about the sixth to tenth day. By the fourteenth day, the membrane and sloughs were separating and soon a clean healing area was left, the final process or restoration being achieved in some five to six weeks. It should be remembered that these patients were as a rule much debilitated and healing wounds of all types was liable to be a somewhat laborious and protracted affair.

The scars left were quite strong, smooth and depressed. Some of them will undoubtedly suggest healed syphilis if seen by physicians in this country. Since no vital structures were implicated and since these scars showed no tendency to break down, the end-results can only be described as most gratifying. Areas of scrotal skin not involved in the ulcerative process returned to a normal healthy appearance.

In view of the extensive nature of these lesions it will hardly come as a surprise when I say that general constitutional features were far from insignificant. The condition when fully developed was associated with extreme discomfort, but not much actual pain. Fever of the order 99–100° F. was usual and the pulse frequent (*circa* 100). The more severe case presented the picture of a very sick patient with toxæmia and prostration prominent. It may be mentioned that the toxæmia of the great majority of the scrotal cases was in marked contrast to the good general condition of other types of pure extra-faucial diphtheritic infections, seen during the epidemic. An easing of the toxæmia and prostration was a feature anxiously awaited, for it meant that improvement in the local lesion was soon to follow. Such easing usually appeared

after some five days but might be delayed for as long as ten days and in extreme cases even for two weeks.

A co-existing respiratory localization exerted a marked influence on the scrotal lesion. Anterior nasal rhinitis was an associated infection in 36 instances. In these cases the scrotal lesion while following the pattern of the pure scrotal cases described above was almost invariably of quite mild degree. Indeed so much so as to raise the possibility that the patients in this category possessed at least some degree of immunity.

The story of coincident scrotal and faucial diphtheria presented a very different picture. A case fatality-rate of almost 60 per cent (if a percentage may be permitted in a small series of 17 cases) is sufficiently startling in any infectious disease. In diphtheria it is almost horrifying. The lethal propensities of this combination of localizations were remarkable, being surpassed only by laryngeal diphtheria.

The cases in this group fell sharply into two categories. In the first, numbering 6 examples, the scrotal lesion although varying from slight to severe conformed to the various gradations seen in pure scrotal diphtheria. All 6 made good recoveries, half of the group receiving antitoxin. The second group of cases, numbering 11 instances, presented a remarkable picture. Commencing as an ordinary scrotal diphtheria there evolved with dramatic speed and suddenness an extraordinary scrotal, perineal, and abdominal gangrene which spread in a totally uncontrolled fashion over the perineum, the inner aspects of the thighs and forwards, often widely, over the anterior abdominal wall. Extensive gangrene and slough with wide and deep ulceration especially in the crutch and much loss of tissue culminating in a green, grey, black stinking mass. *Pari passu* the throat infection extended widely upwards to the nasopharynx and downwards towards the larynx which it reached in one case. Toxæmia was overwhelming. The only case to survive was one receiving 30,000 units of antitoxin early in the disease which at least indicates that the condition might prove amenable to specific therapy. Although a good deal of tissue had been lost in this case and the contents of the scrotum exposed, tissue regeneration was remarkable and the end-result was eminently satisfactory. Amongst the 10 fatal cases the average period of survival was nine days the shortest being two days and the longest twenty-three days.

CUTANEOUS DIPHTHERITIC ULCERATION

In this country, chronicity, indolence, and resistance to treatment appear chiefly to have characterized cutaneous diphtheritic lesions and prompted the necessary bacteriological investigation (Rolleston 1928). Those features aside, a striking and readily recognized picture has been uncommon and the most usual story has been of an impetigenous-eczematous lesion, highly resistant to accepted lines of treatment (Dawson, 1910; Williams, 1943). Nevertheless it must not be forgotten that membrane formation is, on rare occasions to be found.

By contrast, those with experience abroad are generally agreed that the

veldt or desert sore tends to run a special clinical course. "Beginning with a vesicle, usually round a hair follicle and at the site of some previous injury, this bursts and forms a shallow ulcer which is acutely painful. A chronic punched-out ulcer with undermined edges results and may persist over a long time" (Manson-Bahr, 1946). The chronic lesion is the subject of an excellent descriptive portrait by Cameron and Muir (1942). "The chronic sore was usually circular or oval, occasionally linear in an infected scratch, punched out and clear cut, varied in width from $\frac{1}{3}$ to as much as 2 inches. The edges were hard, raised and rolled, with a pale bluish tinge and the base was flat and even. In many it was covered with a leather-like, dark, scab membrane beneath which was unhealthy pus containing anaemic granulation tissue.

Perhaps the most striking departure from this classical picture under the climatic conditions of high humidity as well as high temperatures presiding in Malaya was the apparent absence of the acute vesicle stage described by Manson-Bahr (1946). That this commencement never occurred I cannot certainly affirm for I did not observe many lesions from their earliest beginnings, but both my own conclusions and the conclusions of the many medical officers whom I questioned were against such a mode of onset. In addition, no patient ever described such a picture. The inevitable story was of a pre-existing lesion of one sort or another which underwent a rapid and serious deterioration or which entered a peculiarly resistant phase.

Unlike the scrotal cases, the predisposing lesion in this group was in no way specific—any skin lesion might suffice, but common ones were abrasions, cuts, bites, stings, scabies (a potent source), ulcerative dermatitis, burns, boils, epidermophyton and the breakdown of old scars. The series also includes three cases of true wound diphtheria—two circumcisions and a hernia wound. On the part played by less specific predisposing elements, I am unable to speak with any force. A diet grossly deficient in protein, vitamin deficiency, the possibility of a co-existing nasal or faucal carrier state and so on, all suggested possible lines of investigation which had however to be abandoned under the circumstances.

Cutaneous diphtheritic ulcerations were observed in 198 patients comprising: 186 instances of pure cutaneous diphtheria unassociated with clinical evidence of involvement of the nose and/or throat; 10 instances in which the specific ulceration co-existed with a respiratory localization (3 anterior nasal and 7 faucial); and 2 cases with concomitant labial diphtheria.

It may be, I think, worth while to consider here the first case of cutaneous diphtheria to be recognized in its acute phase during the epidemic, especially as a similar story occurred in the experience of Kay and Livingood (1946) whose attention was first attracted by a fatal cardiac case. I did not have the opportunity to examine this case and I am chiefly indebted to the notes of Captain E. K. Cruickshank, R.A.M.C., for the details of the case.

The patient was admitted early in August 1942 with a diagnosis of "severe ulcers of feet." A few days later (approximately the eleventh day of the disease), a very slow pulse attracted attention and the findings at this point

were: pulse 32, B.P. 85/50, no enlargement of the heart or liver, sounds faint but pure. Three days later the patient's condition was unchanged save that the pulse was now 44 per minute. After the lapse of a further six days (twentieth day of the disease) the patient vomited several times, pulse 50 and very feeble, B.P. 78/50, and the heart sounds tic-tac. Suspicion that these changes were diphtherial in origin was aroused and smears taken at Captain Cruickshank's instigation were reported K.L.B. ++ but the patient's condition rapidly deteriorated over the next few hours and death supervened that evening. Autopsy (Captain Lennox, R.A.M.C.) revealed extensive and deep necrotic ulceration of the feet, a dilated and soft heart and numerous hæmorrhages. Smears from the feet showed K.L.B. +++ and the picture was considered consistent with death from diphtheritic myocarditis.

Any attempt to produce a standard description of the clinical appearances of cutaneous diphtheritic lesions is, I feel, not only very difficult but rather unfortunate, for these lesions are prone to be distinctly protean in their manifestations and a preconceived picture was (and is) the surest route to a missed diagnosis. Nevertheless it is clearly impossible even if it were desirable to describe the 186 individual cases of pure cutaneous diphtheritic ulceration and in my search for some sort of categorization of the cases I found them to fall with considerable precision into two major classifications and each of these in turn are considered under the headings:

(1). Nondescript Lesions.

(a) Bizarre Forms—28 cases.

(b) Purulent Ulcers—33 cases.

(2). Membranous Ulcers.

(a) With Grey Membrane—61 cases.

(b) With Black Membrane—64 cases.

(1). *Nondescript Lesions*: This major group comprised 61 examples. Although without exception, they gave a positive growth of the *Corynebacterium diphtheriæ*, the lesions possessed no outstanding clinical characteristics save chronicity, indolence, and resistance to treatment, which might strongly support the diagnosis nor were complications of such frequency or severity as wholly to refute the supposition that avirulent forms or diphtheroids were the organisms isolated. Nevertheless, at the time, I had no alternative but to regard the cases as instances of true cutaneous diphtheria and to base their management on that assumption.

(a) *Bizarre Lesions*: Taking the form of persistent sinuses, paronychiæ, infections of the nail bed, weeping epidermophytosis, anal excoriations, etc., these cases numbered 28. In the absence of suspicious associated circumstances there was nothing save chronicity and resistance to treatment to prompt search for the specific bacillus, but the presence of large numbers of cases of cutaneous diphtheria naturally led to the swabbing of any lesion which failed to respond to routine treatment. Great patience and insistence on complete rest are vital in treatment. All the cases were ultimately brought to a satisfactory conclusion without serum and complications were exceptional.

(b) *Purulent Ulcers*: This variety of sore, of which 33 examples were observed, at least gave rise to suspicion more readily than the preceding series, for the picture was a fairly characteristic one. The ulcer, or, as was more usually the case, the ulcers were as a rule around $\frac{1}{2}$ inch in diameter and rarely attained 1 inch in size. Comparatively shallow with an appreciably raised, indurated, rolled edge and slight surrounding erythema, the base on first inspection consisted simply of a copious pool of purulent fluid. If, however, the sore was cleaned up it could be seen to be lined with a thin, rather firmly adherent coating of grey membrane with a tendency to climb up the margins of the ulcer. Especially if not carefully examined, the lesion is not readily diagnosed by the uninitiated, but in time I became able to make a tentative clinical diagnosis with a good deal of confidence that the specific bacillus would be found, as it was in every case in the series.

The chronicity of these lesions was quite remarkable and their cure proved a severe drain on the patience of the unfortunate sufferers. Nevertheless a successful outcome was forthcoming in every case even without anti-toxin.

(2). *Membranous Ulcers*: Into this major category no less than 125 cases could be considered to fall. As a series they presented a clinical picture so suggestive as to bring the correct diagnosis immediately to mind. To appreciate the appearance of these lesions it should be borne in mind that the exudative element of the diphtheritic membrane was somewhat in abeyance in this type of ulcer and that the element of coagulation necrosis, gaining the ascendancy, an extremely firm, tough, leathery slough rather than a membrane resulted. This scab-like structure was firmly adherent over its whole extent, removal being quite impossible (and ill-advised) without extreme pain until the natural process of healing had set in.

The peculiar factor of faucial diphtheria has a quality which has long defied description. Similarly the peculiarly foul and revolting odour emanating from a considerable proportion of ulcers in the membranous group, although to me quite characteristic, cannot be adequately described.

I would here emphasize that this cutaneous ulceration proved quite a different proposition from the lesions described earlier as scrotal and perineal gangrene seen in co-existing scrotal and faucial diphtheria. Cutaneous diphtheritic ulceration as I saw it tended almost invariably to enter a self-limiting phase spontaneously, whereas the gangrenous lesion possessed particularly uncontrollable propensities.

(a) *The Cases with Grey Membrane*: 61 cases presenting the picture of one, or more frequently from two to six ulcers oval or irregular in shape and some $1\frac{1}{2}$ inches by 1 inch, occasionally smaller but rarely much larger—the largest ulcer seen in this group being $2\frac{1}{2}$ inches in diameter—provide the substance of this group. The appearance of the ulcers varied somewhat with size. The smaller ulcers were shallow and not uncommonly saucer shaped. The margin was sharp and demarcated by a slight rim of induration with surrounding moderate erythema and barely perceptible œdema but

little associated pain and tenderness. The larger ulcers on the other hand suggested a much more vicious infection, revealing an irregular step-like margin down to a depth of $\frac{1}{4}$ – $\frac{1}{2}$ an inch, while in some situations, especially the groin, extremely deep penetration might occur. In this situation too there was a curious tendency to serious lateral extension with, as the end-result, a formidable serpiginous ulcer a couple of inches or more across. Only very rarely was the ulcer sharply punched out.

The typical, indeed the diagnostic feature was, however, the tough adherent, circumscribed, whitish, yellow, dirty grey or greenish slough occupying the whole floor of the ulcer. I never observed the membrane to extend beyond the margins of the ulcer.

(b) The Cases with Black Membrane: This type of sore formed by far the most striking picture and was observed in 64 cases. Single sores were common, although multiple lesions were still far from infrequent. Tending on the average to a considerably greater size, the dimensions varied from $\frac{1}{2}$ inch up to $4\frac{1}{2}$ inches, and all the very large ulcers conformed to this type. The shape of the lesion was subject to wide variation and a good deal of irregularity was the rule. A characteristic, especially of the larger ulcer was the abrupt, steep, punched out, sharp, cliff-like margin dropping to a depth even as great as $\frac{1}{2}$ inch. In the groin there was the usual tendency to burrow deeply and extend laterally often in a series of bay-like extensions. Rather greater induration, erythema and surrounding œdema especially with lesions about the feet was usual.

The membranous slough possessed its own special manifestations. The same dense, tough, thick, adherent structure; it was dark brown, hæmorrhagic or almost black in colour with a smooth dry scab-like surface. Separating almost *en masse* as a firm leathery slab with black upper surface and firm grey necrotic material below, it left a great trough-like ulcer with deep margins and a purulent base which when cleaned out revealed pale, coarse granulation tissue. With both types of membranous ulcer the regional lymph glands were implicated to a variable but never more than moderate extent.

Constitutional features in pure cutaneous diphtheritic ulceration were in the main conspicuous only by their absence, in contrast to the scrotal lesion. Toxæmia was invariably absent in the nondescript type of lesion (bizarre and purulent ulcer forms). As a rule clinical evidence of toxæmia was also absent even with quite large membranous ulcers although occasionally slight fever, tachycardia and a degree of prostration were noted. From time to time ulcer cases were admitted with a lesion three to four weeks old and a history of having "fainted" once or twice. Examination invariably revealed tachycardia, extra-systoles and the like indicating that myocarditis was already present.

The progress of the nondescript forms has already been detailed, the most prominent features being the extreme resistance to treatment of seemingly insignificant lesions. Progress in the membranous forms was also slow. In the absence of antitoxin the slough separated slowly—rarely in less than ten to fourteen days—to leave a dirty ulcer which, however, soon

cleaned up to yield a healthy granulating surface. From this point progress was again tedious. Epithelialization proved a difficult business and the end-results especially with the larger "grey" ulcer was a thin parchment-like scar very prone to breakdown under minor trauma. The final stages of healing were especially difficult. With the black membranous type progress was similar but epithelialization, despite the larger general size, easier and the scar, although still thin and parchment like, less prone to break down.

In three instances healing under conservative measures proved impossible. In one, the ulcer overlay a mass of scar tissue, a sequel to a shrapnel wound. It was ultimately considered necessary in these 3 cases to resort to excision of the scar and skin grafting with excellent results. In each case a small dose of antitoxin was administered prior to operation. I would emphasize my opinion that this represents the only place for active surgery in the treatment of these lesions.

Why the "grey" and "black" membrane forms in which the underlying pathology was clearly similar should differ in particulate detail—depth, size, ease of healing and so on was not clear but such differences were repeatedly observed.

The commonest site by far for these various ulcers was the lower extremity—feet, legs and thighs in that order; next came the arms; then the groins; the penis (scabies); the buttocks (scabies); the trunk; and finally occasionally the neck, the ears and the face.

COMPLICATIONS

It is proposed to deal here only very briefly with the very interesting problem of the cardiovascular and neurological complications observed in the extra-faucial cases. Of the 167 cases exhibiting a scrotal localization, 12 ended fatally while non-fatal complications (circulatory and/or neurological) appeared in a further 37 cases. The case fatality rate was 7.18 per cent and the total incidence of complication 29.3 per cent. It is, however, of interest to deal with the different localizations of the infection as separate groups of cases.

On this basis the 99 pure scrotal cases suffered one death, a 19 per cent incidence of neuritis and a 12 per cent incidence of cardiac involvement. As neuritis and myocarditis were occasionally common to one case the actual number of cases exhibiting complications, fatal and non-fatal, was 26 in 99 (26 per cent). Of 17 cases with a co-existing scrotal and pharyngeal infection, 10 died and 1 developed non-fatal myocarditis. Concomitant anterior nasal and scrotal diphtheria was by contrast a relatively mild combination although non-fatal complications appeared in 8 of the 36 cases. One death and 3 cases with both myocarditis and neuritis marked the group of 10 patients with scrotal diphtheria and cutaneous diphtheritic ulceration elsewhere on the body.

In the cutaneous ulcer series the findings were very similar. Of the 186 cases exhibiting a cutaneous lesion only, one died from dysentery almost at the outset of the disease and may be excluded from the figures. The remaining 185 cases suffered 2 deaths, a 21.3 per cent, incidence of neuritis (40 cases)

and an 11·82 per cent incidence of cardiovascular involvement (22 cases). These complications were distributed over 52 or 28·1 per cent of the cases.

Of 7 cases with co-existing pharyngeal diphtheria and cutaneous diphtheritic ulceration, 2 died and 5 made uncomplicated recoveries. Of 3 anterior nasal-cutaneous cases complications appeared in one.

There were thus available for study 295 cases of pure cutaneous diphtheria comprising the 99 cases of pure scrotal diphtheria, the 186 instances of pure cutaneous ulceration, and the 10 examples with a combination of those two lesions. Clinical evidence of those cardiovascular and neurological complications which are peculiar to diphtheria appeared in 82 or 28 per cent of the cases. The case fatality rate from diphtheria was 1·35 per cent, the incidence of myocarditis 12·88 per cent (38 cases) and the incidence of neuritis 21·38 per cent of those exposed to risk.

TREATMENT

Under prisoner-of-war conditions the proper treatment of those cases presented grave and at times insuperable difficulties.

(a) Rest: The necessity for a proper nursing regime was self-evident and every effort was made to provide absolute rest as far as our circumstances permitted. A fairly satisfactory regime was achieved and in general consisted of three weeks flat in bed, four to five weeks slowly increasing activity in bed, four weeks activity in the ward and four weeks convalescent under supervision at the end of which period the patient reported back to me for final examination. This may appear unduly cautious but the lack of antitoxin raised problems in treatment to which our only answer was rest. Attempts to reduce these periods appeared to result in or, at all events, to aggravate paresis. Time being the one commodity which could be freely squandered it was early decided that the wisest policy was to make haste slowly.

In the event of evidence of myocarditis declaring itself an appropriate extension of those periods was made and a patient was always in bed until the heart had been normal for two weeks. When neuritis appeared after a patient had been allowed up he was kept in bed to observe progress as I was satisfied that continued activity was detrimental to such cases. However, neuritis having reached its height and begun to improve, the sooner activity within the limits of fatigue (in the absence of cardiac implication) was resumed the more satisfactory and speedy was the recovery of function.

(b) Local Treatment: The first essential of the local dressing in the scrotal cases was that it be continuously moist, both from the point of view of the comfort of the patient and in order to achieve control of the infection and healing. A multiplicity of solutions was tried such as eusol ($\frac{1}{2}$ strength), acriflavine 1/1000 in water, biniodide of mercury 1/4000 in water, normal saline, etc., but in the end a 5 per cent *boric solution* was found infinitely superior to all as it appeared to possess curious soothing and healing properties in the scrotal case. Dressings had to be well soaked and changed frequently as they became grossly soiled with discharge in a very short time. *Infinite pains* were required in applying the dressings so as to ensure non-apposition

of all skin surfaces and to keep them that way. Only in this way could chafing and transfer of infection to the thighs, the penis and so on be minimized.

The general management of the ulcer cases was conducted on ordinary surgical principles. As a local application I favoured half-strength eusol or simply normal saline. I have already condemned active surgical intervention except to achieve healing in the final stages of difficult cases.

(c) Specific Therapy: (1) This therapeutic measure is included under "specific" for it was quite futile to attempt treatment in a scrotal case unless an attack was directed against the predisposing lesion. Pure vitamin preparations were not available and all manner of substitutes were tried including green vegetable extracts, rice polishings and so on but none were seemingly capable of producing the necessary concentration of the B complex and in every case resort to marmite or vegamite (fortunately available) became necessary. A suitable dose was 2 ounces daily but half this amount would just suffice in many cases. This preparation paved the way to recovery.

(2) Antitoxin Therapy: The administration of diphtheria antitoxin was an event especially in a pure cutaneous case for our supplies were very limited. Of the 365 cases only 25 received antitoxin. The dose varied from 8,000-30,000 units but was usually nearer the former figure. Even this may seem a heavy dose in view of the lack of the drug, but it must be borne in mind that our supplies had suffered many vicissitudes before reaching us. Much of it was long past the manufacturer's expiry date and had spent months or years in a tropical climate without refrigeration. Whether for these reasons or because of the severity of the infections or because of the debilitated state of the patients smaller doses were prone to be ineffectual.

Amongst the 295 pure cutaneous cases with no associated respiratory localization only 13 received antitoxin. The group is thus for practical purposes non-serum treated. As a rule in these cases serum was given very late, eighth to twelfth day and response was slow but very satisfactory. Within five days a deteriorating lesion had invariably been converted into a healing one and there seemed little reason to doubt that with antitoxin available at an early stage little difficulty would have been encountered in these cases. Complications appeared in 5 of the 13 cases receiving antitoxin but of course the cases were all of the most serious type.

SUMMARY

An account has been given of certain clinical data which it was possible to preserve relating to a group of 365 cases of cutaneous diphtherial infections amongst British Prisoners of War in the Far East.

The history of cutaneous diphtheria over the past century emphasizes the not inconsiderable importance of these infections to the Army hygienist in the field. Without being a problem of first magnitude amongst our armed forces, extra-facial diphtheria has nevertheless been the cause of a great deal of protracted and incapacitating illness which might well have been prevented.

The epidemiological background is outlined, but the various and complex predisposing factors may be considered to amount in aggregate to a peculiarly vicious environment linked with a wide dissemination of the specific organism of diphtheria. The development of diphtheria on the unabraded skin is a subject of much controversy but Trousseau's dogma that diphtheria never "developed itself on the skin unless it was previously deprived of its epidermis or ulceration" applied fully in my experience.

The extra-faucial localization fell into two broad categories—scrotal diphtheria and cutaneous diphtheritic ulceration. Chiefly responsible for exciting my interest in extra-faucial infections, scrotal diphtheria was diagnosed in no less than 167 instances. In 99 cases no other focus of infection appeared to exist; in 10 cases there was associated cutaneous diphtheritic ulceration elsewhere on the body; and in 53 examples anterior nasal or pharyngeal diphtheria co-existed. 5 patients with labial and scrotal membrane complete the series.

The appearance of so great a number of cases of this curious localization could be traced directly to the widespread prevalence of the scrotal element of the hyporiboflavinosis triad of angular stomatitis, glossitis and scrotal dermatitis amongst the prisoners.

Diphtheria of the scrotum, in the absence of concomitant pharyngeal infection presented as a relatively acute, highly characteristic inflammatory lesion associated with an appreciable degree of generalized toxæmia. Advancing rapidly to its peak over the first few days the inflammation soon entered an indolent phase persisting over the next two and even three weeks. With the cessation of activity the lesions healed slowly in men who were much debilitated and undernourished.

Positive cultures for the *Corynebacterium diphtheriæ* were obtained in 125 cases while in 42 the diagnosis was clinical. Of these 42 no less than 20 later exhibited complications.

The cardiovascular and neurological complications peculiar to diphtheria were common following a scrotal localization, but chief interest probably attaches to the findings in the group of 99 pure scrotal cases. Over a quarter (26 per cent) of these patients developed myocarditis or multiple neuritis or both. Cardiovascular involvement was observed in 12 patients (12 per cent) and neuritis in 19 cases (19 per cent). Over the whole series of 167 scrotal cases the case fatality rate was 7·18 per cent, and the total incidence of complications peculiar to diphtheria 29·3 per cent.

Cutaneous diphtheritic ulcerations were encountered in 198 patients. In 186 no other focus of infection was discovered; in 10 instances there was a co-existing respiratory localization; and in 2 concomitant labial diphtheria. In 166 cases the specific infection was confirmed by the bacteriologist. In 32 the diagnosis was purely clinical.

The cutaneous lesions could be divided into two groups. The first of these, totalling one-third of the cases embodied nondescript or non-membranous lesions. The second group, amounting to two-thirds of the total

was composed of lesions with definite extensive and characteristic membrane formation. The membrane presented as a firm, tough, adherent, leathery scab-like slough which might be grey or black in colour. The "grey" and the "black" forms occurred with almost equal frequency. Black membranous ulcers although tending to a considerably greater average size, healed more readily and were not attended by a significantly greater incidence of myocarditis and neuritis.

Myocarditis and neuritis were both frequent following pure cutaneous diphtheritic ulcers, the former appearing in 11·82 per cent (22 cases) and the latter in 21·3 per cent (40 cases). These complications were distributed over 52 (or 28·1 per cent) of the cases.

Of the 295 instances of pure cutaneous diphtheria in which no focus of diphtheria other than the skin or scrotum was apparent clinical evidence of those cardiovascular and neurological complications which are peculiar to diphtheria appeared in 82 or 28 per cent. The case fatality from diphtheria was 1·35 per cent, the incidence of myocarditis 12·88 per cent (38 cases) and the incidence of neuritis 21·38 per cent of those exposed to risk.

The measures of treatment adopted are outlined but the series is, for practical purposes, non-serum treated.

I am indebted to Lieut.-General N. Cantlie, C.B., Director-General Army Medical Services, and to The University of Aberdeen for permission to publish this report. I also wish to thank the many officers and men, too numerous to mention by name, who worked with me in the diphtheria wards. Their efforts above all kept the mortality from diphtheria within reasonable bounds.

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VIEWS ON THE USE AND ABUSE OF PSYCHIATRY

BY

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WHEN a physician sees a patient he should assess him from two main aspects namely:

- (a) The Psychogenic aspect and
- (b) The Physiogenic aspect.

Where necessary or indicated he institutes special tests or investigations to exclude a possible organic cause for ? somatic manifestations and to establish confirmatory evidence of symptoms or signs primarily believed to be of organic origin but which may well be of psychogenic origin. Physicians should be able to make a psychiatric diagnosis and be able to treat at least minor psychogenic disorders. Only difficult cases of psychoneurosis and hysteria as well as probably all cases of psychopathic personality and incipient or marked psychosis should be referred to a psychiatrist.

The routine adopted by some physicians of referring all cases believed by them to be of psychogenic origin direct to a psychiatrist is to be condemned just as is the practice of psychiatrists who refer all their cases to a physician to exclude organic disease. Such physicians and psychiatrists are incompletely trained in my opinion. Their attitude is comparable to those who insist on eye specialists prescribing simple eye drops and their application by an "eye-trained" sister.

In some cases the patient is not assessed by the physician/surgeon from the psychogenic aspect. He is viewed as someone who has symptoms/signs which must be of organic origin. After varied investigations, the number depending on the tenacity of the physician, have been carried out with apparently negative results, the physician either out of frustration, and certainly with the wrong outlook, labels the patient in almost contemptuous fashion as "Functional" (a word which should be erased from medical terminology), "Neurotic," "Hysterical" or even malingering. It is not only in cases of irregular pyrexia of indeterminate origin that the patient may be so designated. Even in cases where the psychogenic origin of the symptomatology is, or should be, obvious, the obvious is ignored and what still finds itself described as a disorder of the heart, namely effort syndrome, is applied where the manifestations of a psychoneurosis would appear to be predominantly referable to the cardiovascular system. Neurocirculatory asthenia is no alibi and neither is cardiac neurosis.

Some physicians are even more tenacious in their search for organic disease and finally, in despair, the patient minus his appendix and gall-bladder is referred for psychiatric opinion.

Experience indicates that all trainee medical specialists should have six to twelve months' intensive psychiatric training in a mental hospital so that they can examine a case properly and make a true psychogenic assessment of every case whether or not the main or urgent treatment is essentially medical. Surgeons, gynæcologists and all other specialists could also benefit from a course on similar lines although of shorter duration.

We are all apt to talk of the normal or average man, but what or who is he? Surely the normal individual is a hypothetical subject whose qualities and characteristics exist only on paper or in the minds of theorists?

If every individual had a psychiatric case sheet it is probably fair to say that the majority of these case sheets, presumably the overwhelming majority, would make dull and uninteresting reading and would be considered "average" or well within "normal limits" for John Britain. Others, however, would show a history of psychoneurosis with or without somatic dysfunction of varying degree, of inadequacy, of perversions, of homosexuality, of psychopathic personality, of psychopathic trends or of incipient or frank psychosis. But only a small percentage of such individuals would not be considered good citizens and law-abiding people if the yard-stick of good citizenship included failure to be caught breaking the law. By such factors as their birth, training, environment, experience, education and respect for, or fear of the law as well as by their insight into their reactions to circumstances as well as their full appreciation of the lot of the transgressor, individuals learn to be law-abiding or near law-abiding citizens with varying degree of sense of duty be that voluntary, compulsory or considered expedient. Not only may authors and poets, great and small, be regarded as psychopaths, psychoneurotics, perverts or hysterics. "Everybody is queer but thee and me and thee's queerer than me." That is a point of view. However, the mere fact that an individual is a psychopath, a psychopathic personality or someone with psychopathic trends does not necessarily require that he should be certified. Furthermore an individual who is certifiable under existing modern standards need not necessarily be judged by any means as unfit to plead. It is remarkable how many individuals are considered certifiable or are only too ready to be so certified or be the subject of a truly psychiatric report when they find themselves in conflict with the law in respect of some charge for which the penalty may be severe or even death by judicial hanging.

I submit that an individual may be certifiable under modern existing standards but that if he has been able to maintain himself within or beyond the law of the land up till the time he committed a crime, and that crime may be murder, he should be considered fit to plead and his psychiatric disability should in no way affect the carrying out of the maximum penalty; be that death by judicial hanging. An adverse psychiatric report if properly used would act against the interests of a murderer or any other criminal and

would serve the cause of justice. Such reports are too apt to be used as "extenuating circumstances" or as an excuse to lessen the punishment for a crime, to obtain a reprieve or to obtain a decision of unfitness to plead.

I understand that it is commonly taught, that psychoneurotics always have insight into their condition while psychotics have not. In my experience there are obvious exceptions to that rule. Psychoneurotics do not necessarily have insight into their condition while psychotics may have insight into their condition. I believe that the term "controlled schizophrenia" recently used by a scientist in Great Britain on trial for alleged giving away of atom secrets (*The Scotsman*, p. 7, Feb. 11, 1950) is a reality. This description meets the case of the individual who appears law abiding to the outside world but whose other conduct—unknown perhaps to others but himself—is the very reverse. I submit that this Dr. Jekyll and Mr. Hyde type is common, if not just as originally described, at least in their attitude when accused of a crime for which the penalty is severe. Many of us have had dealings with this type who in my opinion formed a large part of the type who went absent during the war and who supported themselves in style, and often at great personal risk, for weeks or months or even years as leading racketeers, or as the close supporters of leading racketeers, in the large cities of various countries during and after World War II. On arrest they readily sought a psychiatrist. To do this they would give a history of "headaches," or blackouts or would swallow metal polish or buttons just to make sure. Inevitably they would be referred to a medical specialist to whom they were a constant "headache" so that organic disease might be excluded. Some would say in a most innocent manner, which they would always maintain, that they did not remember how they went absent. The last they remembered was being "blown up" and when it would appear after months of successful racketeering, requiring much initiative, resource, skill and personal daring, they "came to" they were afraid to give themselves up because they knew that they would not to be believed, so they just carried on! That was their story and they stuck to it. Their apparent sincerity and honesty almost made one feel that for a cap each should have a halo. Such individuals are most self-possessed and as artful as a cartload of monkeys. They vary with their social and cultural background. One of the very smooth types with a markedly privileged background I remember well. Prior to World War II he had been found guilty and severely punished for participating in a robbery characterized by particularly brutal violence. On completion of his sentence he must have been called up or volunteered for service, for he was referred to me in 1943. He did not know that I had been fully briefed regarding his past history. He had just been acquitted by a court martial on a question of unit funds and had suffered or developed a "breakdown." He was the smooth, long-haired, beautifully dressed, perfumed and well-manicured type with a cultured voice. Tearfully he told me how upset he was because, in spite of acquittal by a court martial, his honour was still doubted by his C.O. A few weeks later his "breakdown" appeared to have disappeared because I saw

him in a night club delicately perched on a stool by the Bar with a glass held in the approved spiv manner engaging a brace of V.I.P.s in conversation which they appeared to enjoy. They are wonderful company for a time. Such is the type whom the psychiatrists are so frequently called upon to examine and whom they would appear to defend at all costs to their professional standing and to the detriment of the professional standing of psychiatrists as a whole at least in the eyes of the public.

Psychiatry is a boon and a blessing when it is employed as it should be in the prophylaxis of mental disorders the early recognition of mental diseases and their diagnosis, treatment and management. Why therefore are psychiatrists held in suspicion by law-abiding citizens and appear to be adversely criticized by judges, sheriffs, the public and even by their medical colleagues? "We must not forget too, how often medical opinions are invoked in law courts to excuse antisocial activities. Murders, theft and financial default are attributed to brain-storms or alleged to occur during a loss of memory. The often conflicting evidence of psychiatrists and neurologists cause much public distrust and uncertainty" (Goodby, 1950). Is it because their value as expert witnesses is doubted, because they would appear to identify themselves with the accused in a court of Law and defend them as a mother would defend her child? Is this because it is so strongly ingrained in the Doctor that it is his bounden duty to save life at all costs and that the accused is his patient whom he must help in every way possible, come what may? Is it not wrong that a doctor should be a witness for the Defence or for the Prosecution instead of an expert witness, and therefore a neutral witness, called by the Defence or by the Prosecution in the true interests of justice so that justice will be done and the guilty will bear the full penalty for their crime? At times their reputation is drawn in the mud when a judge has to drag out of them information which is to seal the fate of the accused as regards responsibility and which information they would appear reluctant to give. Surely their attitude and that of those opposed to the death penalty is not affected by the feeling "there but for the grace of God stand I."

That a man may be considered fit to plead, be found guilty and sentenced to death for murder though considered certifiable is well borne out by the Norfolk murder trial in which James Frank Rivett was found guilty of the murder of a 17-year-old schoolgirl. The accused was considered certifiable at the time of the trial by two experts. The jury considered the accused "sane and fit to plead." Mr. Justice Stable described their verdict as a sensible one. After the two experts gave evidence for the Defence another Doctor said that Rivett had been preoccupied with an ill-formed fantasy of murder and his own self-destruction before the case. Yet the accused was found guilty and the judge after pronouncing the death sentence said "I am satisfied that the contribution the jury system makes to the administration of criminal law is invaluable" (*B.M.J.*, p. 380, Feb. 11, 1950). When the learned judge said these words I feel that he was echoing the sentiments of his professional

brethren, the public at large including the Medical Profession as a whole. Among the critics would be the wrongdoers. But I feel that if the attitude of this judge and especially the jury was generally adopted there would be fewer murders and crimes of violence.

An appeal was lodged in the Norfolk Murder Case, but it failed. Lord Chief Justice Goddard is quoted as saying: "Unless and until Parliament ordains that Schizophrenia, which was pleaded at the trial, is to be determined by a panel of medical men, it is to a jury that the decision is to be entrusted."

I submit that the plea "irresistible impulse" should be forbidden. Such a plea is apt to be made when a person of some social standing is accused of shoplifting or some other theft or when an individual is accused of a sudden attack, apparently out of the blue, and without rhyme or reason on another person or persons with or without fatal issue. What is an "irresistible impulse"? As no one can prove such a phenomenon exists surely its alleged existence is based on false premises. It would appear to me that a resistible impulse which is not resisted becomes an irresistible impulse when the conduct resulting therefrom brings the individual concerned into conflict with the law.

I believe that the McNaughten Rules are obsolete, an obstruction to justice and should be replaced. If a man suspected of murder is a congenital idiot and therefore has never been able to support himself any Jury would obviously find him unfit to plead and he would be detained during his Majesty's Pleasure. However, I submit that any accused, no matter of what type of crime he is accused, should, if a constitutional psychopath, be considered fit to plead, except in the most exceptional circumstances, and fit to pay the full penalty for his crime, if up to the time of his crime he has been able to maintain himself by his own effort. To consider such individuals "Guilty with diminished responsibility" is no alternative and no compromise. Such a precedent would lead to all evildoers being found guilty with diminished responsibility. Where would that lead us? Undoubtedly they all have diminished responsibility as law-abiding citizens if they commit crimes. The ends of justice would be put in jeopardy if "Guilty but with diminished responsibility" indicated a lessening of the degree of guilt with a lessening of the severity of the penalty that should fit the crime. Surely such a verdict should be to the detriment of the accused and not in his favour? If that were so, and I submit that is as it should be, then it would become a rarity for psychiatrists to be called for the Defence. The only exception would be when the psychiatrist's report would indicate:

- (1) A "normal" report which would be in the interests of an innocent man, and conceivably also of some murderers, or
- (2) That the accused up till the time of the crime, and since had not been capable of supporting himself and had required the care of some other person or persons, indicating that he was insane and truly unfit to plead, e.g. the congenital idiot or idiocy (acquired).

I believe that no psychiatrist should be allowed to be called for the Defence

where the accused is not allowed into the Witness Box during Trial, e.g. the case of John George Haigh and the case of Neville Heath.

Furthermore I would suggest that in all other cases the Defence should be offered the opportunity of having a psychiatrist's report rendered on their client. If they decide against this then after the verdict they should not be allowed to produce psychiatric evidence should an appeal be lodged or a reprieve claimed. Should the Defence decide to have a psychiatric report, so should the Crown; and both reports should be produced in Court and each psychiatrist liable to be questioned on them by the Defence, the Prosecution, the Judge and the Jury! Preferably such expert witnesses should be called by the Defence and by the Crown, but not be regarded as expert witnesses for the Defence or for the Prosecution but as expert witnesses in the cause of justice. Medicine must not take sides.

With such a system few, if any, accused not normally certifiable, or certifiable under existing standards but fulfilling the criteria already mentioned of being fit to plead, would submit to a psychiatrist's report because it might prejudice their case contrary, it would appear, to the prevailing view.

On certain charges psychiatrists' reports are frequently to the effect that the accused would benefit from institutional treatment. That might be so, but might not many others who never get into the hands of the law benefit likewise? However true such a recommendation might be is it any reason or excuse why an accused should not be punished for his crime when there are fellow "sufferers" living within the law? An exception to this rule might occasionally be the life-long homosexual but all the same it should be borne in mind that many practising homosexuals avoid getting into the hands of the law by avoidance of their "natural" desires, by sublimation, by masturbation, by undergoing treatment voluntarily or by the judicious selection of suitable adult partners similarly afflicted and by the avoidance of "pick-ups," importuning or soliciting. This is a man-made world—so far, so lesbianism is not a crime.

What would happen if a near certifiable type were made the subject of a psychiatric report unobserved and without his permission whilst he was not in hospital or in conflict with the law? He would probably resent this most strongly and seek damages. Doubtless, he would seek a psychiatrist to prove him to be normal. Yet under present circumstances it is not difficult to believe that if such an individual subsequently appeared on a grave charge, he would rush into the arms of a psychiatrist with all speed. At times one is almost driven to believe that an "abnormal" is a "normal" who is being charged with an offence, especially a serious offence.

I believe that a great number of individuals who are considered successful in life are psychoneurotics and psychopathic personalities. Probably few of them have severe breakdowns or come into conflict with the law although some of the latter may owe that fact to their skill in avoiding the law. Be that as it may they have high morale in peace and in war and serve their

country well. The former vastly outnumber the latter, but it would be difficult to say which group has the larger percentage of distinguished members.

Then there are the psychoneurotics and psychopathic personalities with low morale and a well-developed instinct of self-preservation especially when employed in an occupation or in an unpleasant environment not to their own immediate personal advantage. They decide to get away from it all and the initiation of the aggravation of their "normal" somatic manifestations is essentially voluntary. Later these pass beyond conscious control with the result that somatic manifestations become so marked as to pass eventually to a state indistinguishable from hysteria. Now hysteria has been called sub-conscious malingering. Some believe that definition bears close scrutiny. Why then, if so many if not all individuals have points of interest to a psychiatrist, should, except in the exceptional cases already mentioned, a psychiatrist report be called for at all in a legal case other than out of purely academic interest? I submit that, as present used, they are an impediment to the law and could quite well be done without in many cases. An intelligent Jury being able to decide whether or not a man is fit to plead and if fit to plead then able to be found guilty and sentenced to death without dramatic calls for reprieve. The E.E.G. is another potential menace which has now appeared. Soon prisoners will refuse to be tried until the Judge, the Jury and the Counsel for the Crown have all been found to have a normal E.E.G. and a psychiatrist's report. It is understood that in America at least 1 in 200 of the population suffers from epilepsy. Nation-wide application of the E.E.G. might greatly increase the percentage.

I believe that the position in which psychiatrists have found themselves is not of their own choosing. They have been forced into this position of deciding responsibility instead of advising regarding an individual's responsibility as a law-abiding citizen. That is all that they should have to say in their capacity as expert witnesses. The jury should alone decide an individual's responsibility for a crime, and they should decide whether or not he is guilty. They may make a recommendation for mercy. If an individual is found guilty of murder then the penalty is death by judicial hanging and there the matter should end, until the case is reviewed by the Home Secretary (England) or the Secretary of State (Scotland).

Psychiatry is not new and, although the practice of psychiatry by those trained in its use has increased manifold since the outbreak of World War II, it is still passing through a very difficult teething stage. Furthermore it must learn to crawl before it can walk.

The use of psychiatry and the skill of the psychiatrist—evident most certainly outside Law Courts—is welcomed by the Medical Profession and by the enlightened public. The benefits of skilled Psychiatry are apparent in everyday medicine. What a pity that its reputation is suffering because of its use in Legal cases. "Trick Cyclists" once an expression of amusement and then affection is once more being used in contemptuous fashion, all because of the medico-legal aspect of psychiatry.

Suggestions have been made to introduce degrees of murder, but surely the "degrees" of murder which exist at present are all that is necessary, namely murder and manslaughter in England and murder and culpable homicide in Scotland.

CONCLUSIONS

- (1) The McNaughten Rules should be abolished.
- (2) Fitness to plead should be decided by a jury after perusal of psychiatric reports, questioning of the psychiatrist by them and their personal impression of the accused. The Norfolk Murder Trial is a case in point.
- (3) Whether or not an accused is certifiable under existing standards the verdict after a trial should be "Guilty," "Not Guilty," or of course, "Not Proven," in Scotland. The jury may or may not make a recommendation for mercy if the accused is Guilty. If the verdict is Guilty, the sentence should be Death.
- (4) In all cases of constitutional psychosis the criteria of fitness to stand trial should be that the accused, up to the day of the crime, had been mentally able to support himself whether lawfully or unlawfully.
- (5) Except in cases, obvious to a layman, where the individual is unfit to plead, psychiatric reports should merely be a statement of fact concerning the individual's psychogenic constitution, and not to be used as a method of evading justice in whole or in part.
- (6) Psychiatric reports should be forbidden for the defence when the accused is not allowed into the witness box.
- (7) The Defence should not be allowed to request a psychiatric report should an appeal be lodged or a claim for a reprieve made if one was not called for during the trial. When a report is called for it should be produced in Court in every case for study and cross-examination by the Judge, Jury, the Defence, and the Prosecution.
- (8) Psychiatrists should not behave as witnesses for the Defence or for the Prosecution but as expert witnesses, and therefore neutral witnesses in the cause of justice. Their reports should not influence the course of justice in cases fit to plead.
- (9) The suggested verdict of "Guilty but with diminished responsibility" should be dropped at once.
- (10) In all trials the two verdicts in England and the three verdicts in Scotland should remain, and so should the two "degrees" of murder in England (murder and manslaughter) and in Scotland (murder and culpable homicide).

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HEALTH EDUCATION IN THE ASSEMBLY OF THE HONG KONG FORCE

BY

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“—and at least you will not be able to say you became a victim of sickness through ignorance—”

Extract from broadcast aboard H.M.T. “Lancashire” en route to Hong Kong—September 1949.

THE assembly of the British Army force in Hong Kong between June 1949 and February 1950 was accompanied by an interesting advancement in mass health education. For the first time—as far as is known—an effort was made to indoctrinate an entire force, not with scattered and inco-ordinated lectures but by skilled teams working in concert towards a definite objective.

The dominating theme of the project, both in planning and in execution, was to provide each man with such information as to enable him to maintain his positive health and to protect himself against preventable disease.

The task of preparing the officers and men for the “risks potential” in their new station devolved upon Medical Directorate at FARELF Headquarters in Singapore, and there it was decided to tackle the job in such a way that, as far as possible, the men would be lectured before their arrival in Hong Kong.

To achieve this it was necessary to put teams of experienced lecturers aboard the troopships to carry out their work on the voyage from Singapore to Hong Kong. During certain phases of the operation, however, it was not unusual for several ships to sail virtually on the same schedule and, as the availability of suitable instructors was very limited, it was necessary from time to time to vary the original intention and provide the instruction immediately after the arrival of units in Hong Kong. In one instance the lectures were given on the voyage between Ceylon and Singapore and in another, while the troops were delayed at Singapore due to damage to their ship.

The new force was being built up of regular soldiers and national servicemen: many of them had never been overseas before, and of those who had, few had been to the Far East. Therefore, to understand the perplexities of the job, it is necessary first of all to look at Hong Kong as it was fairly certainly visualized by the average British other rank. To him this was no posting to the desert or the jungle but a move to an oft-acclaimed high spot of the Empire.

He regarded Hong Kong as nothing more or less than a British city over-

seas, and, if the "old soldier" was to be believed, a first-rate military station. He had no knowledge of the proposed disposition of the force and the planners realized that it was going to be difficult indeed to convince him that such a place—as he imagined it—could present any threat to his health. There were also among the men those who displayed inherent indifference to the whole move. To them Hong Kong was just a "far away place." Of its geographic and climatic aspects they knew very little, of its social development and natural history they pretty certainly knew nothing at all.

Each lecture team—as far as possible—comprised an officer and two senior N.C.O.s, and the personnel selected had all spent some considerable time in the Far East. By a fortunate stroke a team of instructors from the School of Hygiene, Far East, had been active with the garrison force in Hong Kong during May and June and had in fact lectured to the first reinforcement battalion—1st Bn. Royal Leicestershire Regt.—on its arrival in the colony. This team was recalled to Singapore and embodied into the new scheme. Its up-to-the-moment appreciation of conditions and health hazards in the new operational area formed a good topical foundation on which the other teams could build.

The primary object of the work was clearly—if coldly—given in the original directive as "To provide instruction in hygiene to officers and men proceeding to Hong Kong." The subjects to be covered were:

- (a) Excremental diseases—cause and prevention.
- (b) Field Sanitation.
- (c) Personal Hygiene—including Bites and Stings, Skin Diseases and Venereal Disease.
- (d) Water and Health (Heat Exhaustion).
- (e) Sterilization of small quantities of water.
- (f) Scrub Typhus—transmission and prevention.
- (g) Malaria (Personal Protection).

In order to ensure unequivocal instruction on all troopships, the lecturers were collected together at the School of Hygiene, F.E., and briefed on the data to be imparted. The *modus operandi*, however, was left sufficiently fluid to allow each instructor to handle his particular subjects in his own individual style. This proved to be a wise policy and the lecturers quickly developed the ability to adjust their methods to suit the varied requirements of different audiences.

A comprehensive time-table was drawn up to enable the teams to cover the syllabus in four days and although many factors arose to cause the original schedule to be modified, the teams, often working in very difficult conditions, managed to impart all the material to the personnel on each ship.

In the light of experience gained on the earlier ships covered by the scheme, it was subsequently deemed advisable to temper the bare facts of health maintenance with interesting morsels of local information. The idea was to fit the new arrival smoothly into his future environment, and to give

him the benefit of applicable local knowledge even if sometimes it meant going beyond the generally accepted bounds of pure hygiene. This required a lot of forethought and careful planning as it was imperative to ensure that the importance of the subject matter was not diminished by the addition of topical adjectival material. The instructors quickly developed skilful methods of getting the Hong Kong picture over to the men without prejudice to the primary object of the task in hand. An explanation of the careless characteristics of native food and refreshment dealers; the danger of commercial ice in drinks, the threat from disreputable ice-cream dealers, the use of human fæces as manure by native farmers and the consequent danger in eating ill-prepared fresh vegetables, all helped to press home the excremental problem. Similarly the influence of climatic conditions and the irresponsibility of many local laundry contractors assisted the instructor in his talks on skin diseases.

In the lectures on rabies it was found beneficial to explain the widespread—but illegal—practice of killing dogs to satisfy the Chinese habit of eating “sweet flesh” (dog-meat) and the consequent defensive attitude that had been kindled in the animals, before explaining the stringent anti-rabies precautions of the colony.

Different team leaders used different methods, but generally speaking that was how the subjects were tackled. The three examples shown had counterparts in the remainder of the syllabus, but no matter how the material was dressed up, the whole idea was extremely popular with the men. Beneficial instruction was given in an interesting way: in a way, in fact, which often raised considerable enthusiasm in the men, so facilitating their appreciation and assimilation of the important facts. As each course progressed audiences began to regard the team personnel as advisers rather than instructors and a relationship something akin to golfer and caddie sprang up between them. Questions were always encouraged. The men usually responded well although there was, occasionally, the megalomaniac who wanted to relate some highly coloured previous experience. The instructors tactfully contrived to show even this type of man that the future and not the past was the criterion.

During the massing of the force teams worked aboard 9 troopships. One of the teams lectured to troops from 5 other ships immediately after their arrival in Hong Kong, and to the complement of one troopship while she was delayed in Singapore. In all 14,056 officers and men were covered by the scheme.

It is difficult, at this stage, to form any definite conclusions as to the lasting benefit which the force derived from the work. Nevertheless, many interesting points were revealed and a great deal of useful data built up.

COMMENTS

(a) The circumstances of this military movement provided a unique opportunity for mass health education to a very large force.

(b) The methods used by the teams were original, but the success achieved justified any licence which may have been taken.

(c) There is a lamentable lack of general health knowledge among the troops. For example only about one man in 10 knows why he has been vaccinated or inoculated. The question "Why were you vaccinated?" produced such unexpected answers as . . . protection against Syphilis . . . Polio . . . Influenza and Diphtheria!! In addition to this factual ignorance it is obvious that the progressive public services of Britain are taken so much for granted that the average adolescent no longer troubles to enquire how or why they function.

(d) In spite of an acceptance of the circumstances in (c) it is certain that there is a big place—in fact a vital need—for general health education in military training.

(e) The significant factor in this education is the way in which the subject is put over to the men. It must never be drab, ex-libris, or a casual stand-by for filling in blank spaces in an otherwise well-planned programme. It cannot be handled by a reluctant or disgruntled stop-gap instructor. Only the enthusiastic lecturer, combining knowledge, showmanship, to a degree, and a genuine understanding of the man-in-the-ranks can hope to attain anything like maximum success. To strike the right note may require the preparation of a separate lecture for each different group of men, but the reaction which the individual touch promotes is well worth the effort. In other words talk "gunners' talk" to gunners—artisans' language to those of the R.E. and R.E.M.E., etc.—and with the infantry audience it is surprising how well hygiene and "fighting talk" can go together. In this scheme the interest of the men surprised everyone and it is instructive to investigate the reasons.

(1) Everyone aboard ship had to attend, and when the men saw the officers at the lectures they were convinced of the importance of the material.

(2) The instructors, boarding the ship in the East, brought with them an air of local authority, and the general view seemed to be, that as they were the men on the spot, they must be worthy of attention.

(3) The subject matter was skilfully dressed in a fondant of current topics.

(4) It was put over in such a way that it sounded like a consideration of the personal problems of each individual, and there is nothing the British soldier appreciates so much as someone to discuss his difficulties.

(5) The talks were usually illustrated by demonstrations and exhibits. These exhibits, which included specimens of poisonous reptiles, spiders, scorpions, and marine life, etc., never failed to raise a lot of interest. They may be regarded as "props" but they proved most useful. The feeling was that their value as simulants of interest was high—and of course such a display was not extraneous to the course for Hong Kong, after all, has a not insignificant reptile population.

(6) The talks were always given in language which caused neither embarrassment to the educated nor confusion to those of meaner intellect.

(7) Careful and thoughtful planning at every level can do a lot to ensure success. This was vividly revealed when, by chance, an all-Scots team went aboard the "Empire Trooper" to give instruction to an almost completely

Scottish complement. The fact was hailed as a triumph of thoughtful organization and the team in consequence started off with a big advantage.

(8) The attitude of the officers was variable in the extreme. Some senior officers were rather concerned that such instruction coming just before landing might tend to make the men over-cautious to the detriment of military performance—a circumstance not substantiated by subsequent events. Other officers—in spite of the lectures—obviously underestimated Hong Kong and quite openly said that they thought the preparations were over-elaborate. Fortunately both groups were in the minority and most officers were agreed that the scheme filled a most dangerous gap in the present troop movement organization—quite a number in fact declared it to be one of the most important developments they had encountered in recent years. Few of the medical officers going to the Colony in regimental appointments had been overseas before and they were particularly appreciative of the help and advice they could get from the teams.

The young junior officers were probably the hardest nuts to crack. Many of them were going overseas for the first time and an otherwise admirable spirit of adventure rather tended to dim their assessment of this aspect of life at their new station. A great deal depended on the lead they got from their senior officers—in other words, if the senior officer viewed the idea with enthusiasm then that view percolated to the different levels of his unit.

(9) It was, however, among the experienced warrant officers and senior N.C.O.s that the work found its most ardent supporters. They were the ones most closely engaged in the management of the men, and because they saw the talks as helpful advice for the troops—advice that they were not in a position to offer—they gave the teams every assistance.

(10) The move was spread over several months and it was possible to follow up the instructions by visits to units after they had settled down in Hong Kong. The fine reception which team members invariably received clearly showed the lasting appreciation of their work.

One warrant officer who had been required to take his company into a virgin area soon after landing said that his men had carried out their domestic, sanitary and health tasks in a way he had never experienced before, "Because for the first time, they knew why!"

(11) The efforts of the teams, who were after all performing a new task, gave rise not unexpectedly to much discussion and healthy argument. Many constructive suggestions were offered. The majority of listeners thought the scheme should be extended over a longer period than four days. Others asked that it be extended to include talks by "Education" and "Intelligence" on their particular aspects of the new stations. Not everyone was in complete agreement with the syllabus and wanted certain subjects gone into more fully, even to the sacrifice of others. The suggestions were many and varied but probably the greatest justification of the syllabus as written was in the fact that not a single accusation of persiflage was received.

(12) One highly significant factor emerged. Whilst the ideal men to

handle a job like this are doctors who are good lecturers, it is definite that a high standard can be reached using trained laymen instructors who know their subjects and have the ability and showmanship to impart them effectively to others. Outstanding success was attained by a young Scots corporal who without aspiring to brilliant vocabulary, got his audiences round to the right points of view by exploiting the "common touch" and by using the colloquialisms and language which the men understood best. One outstanding example of his ability in this direction is particularly worthy of mention here. For his first lecture aboard a new ship he found himself confronted with a company of hardy experienced Scots. Climbing on to the packing case that was to serve as his platform he was apparently unaware of the passive hostility in his audience. Straightening himself up he looked at them quietly and then said: "Right! Put the razors away." The effect was excellent, and the instructor established, by the use of a few well chosen words. He knew his subject, but just as important, he knew his men.

This paper has been prepared within a few months of the completion of the scheme. It is intended only as a record of the work undertaken, the methods employed, and the reactions and comments of the students as they were noted by the instructors.

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Finally I must record that this report is submitted with the kind permission of Brigadier J. C. Collins, *O.B.E.*, Director of Medical Services, Far East Land Forces.

INFECTIVE HEPATITIS IN NORTH AFRICA

BY

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SEVERAL authors have discussed the occurrence of infective hepatitis amongst troops in the Middle East and the Mediterranean Basin, but all have been concerned with the war years when troop movement was constant and when medical records or statistics could not, in the very nature of things, be as complete or as detailed as may be possible in more settled circumstances. With a view to ascertaining whether the disease behaved in the same way under peace conditions as it did during the war, a survey was made of infective hepatitis as it occurred among troops stationed in North Africa from 1947 to 1950, during which period conditions were ideal for the collection of accurate data on the incidence of the disease and allowed of the detailed interrogation of every single case admitted to hospital over a period of more than two years.

PREVIOUS REPORTED WORK

Van Rooyen and Gordon (1942) reporting on the disease in Egypt concluded that a virus was the pathogenic agent, that the reservoir was man and that the method of spread was by droplet infection. Dixon (1944) gave the incidence in Malta in 1939 as 14 per 1,000 in British Troops and 0.24 per 1,000 in Maltese Troops. Kirk (1945) describing an epidemic among New Zealand troops in the Alamein position during 1942 concluded that the disease was prevalent among German and Italian troops who polluted the ground and the disease was then spread by dust and flies amongst other troops who later occupied that ground. A similar suggestion was made by Mackay-Dick (1947) who thought that the disease could be spread from infected corpses on the battlefield and could be water-borne. Harrison (1947) has described a series of 100 cases in an American Army Battalion in Italy which were proved to be caused by drinking water from an infected well within the unit location—infection of the well being due to faecal pollution. Richmond and Gear (1945) stated that the incidence throughout the Middle East Theatre was 16.0 per 1,000 in 1942 and 14.7 per 1,000 in 1943. Gauld (1946) has described the disease as it affected American troops in the Mediterranean Theatre of Operations, his comprehensive series of eight articles covered a very large number of cases and gave statistical data of rates of incidence, but also noted the epidemic pattern in large and small units. He concluded that transmission was from person to person rather than from a common source such as food or water and that the seasonal incidence, autumn and early winter, favoured

a respiratory mode of spread, it was also noted that the disease was not common among the civil populations of French North Africa and Italy. The Statistical Report on the Health of the Army, 1943–1945, gives a great deal of information on the incidence of the disease among British, Dominion and Colonial troops in the Middle East and Central Mediterranean Theatres. Note is made of the higher incidence in officers than other ranks and of the extreme susceptibility of New Zealand and Canadian troops relative to British troops, whereas Indian and African troops are much less susceptible. The same is true of enteric group fever but the exact reverse is found in the case of tuberculosis. Findlay (1948) has dealt with the disease as seen in West Africa during the war years, he too notes the lesser susceptibility of Africans and has stated that the seasonal incidence is said to follow more closely that of dysentery (a wet season fly-borne disease) than that of either pneumonia or cerebrospinal meningitis (dry season, droplet diseases).

The incidence in the civilian population has been studied in Palestine where Olitzki, Bachi and Kallner (1948) reported that the average incidence could be estimated at about 10 per 1,000 per annum, that the disease is endemic there and is usually acquired in childhood, but immigrants from non-endemic regions become infected soon after arrival. The seasonal incidence resembled that of the respiratory diseases, i.e. maximal in December and January, but a secondary rise among children in July and August suggested that flies and food contamination may play a part in transmission. The incidence amongst the civil population in Tripolitania has always been negligible according to the Director of Medical Services of the British Administration there—infective hepatitis is not notifiable but it is rarely seen by the general practitioners and is never met with in hospital practice. An epidemic of the disease occurring amongst the staff and guests of a hotel in Sweden lasting fourteen months has been described by Olin (1947) who concluded that the disease was water-borne, the hotel water supply becoming polluted from the hotel sewage discharging into the same slow-flowing lake.

As regards experimental work, MacCullum and Bradley (1944) and Findlay and Willcox (1945) have shown that the virus is present in the blood, faeces and urine early in the disease and incubation period, transmission to human volunteers has been effected by oral ingestion of filtrates of these but not with saline nasopharyngeal washings.

THE POPULATION AT RISK

The community under consideration, soldiers living in barracks in Tripolitania, was in many ways an ideal group for any epidemiological investigation. In the first place their exact number was ascertainable at monthly intervals, thereby permitting accurate morbidity rates to be computed. As a rule each unit had a barracks to itself. The majority, about three-quarters, were stationed in and around Tripoli and the remainder in four small towns along the coast. Each unit group was, in most instances, isolated from regular

contact with the others, but there were of course sporadic contacts at football or cricket matches, leave camps, hostels and the like. All lived in close proximity to, and in casual contact with, the indigenous population of Arabs, Italians and Jews.

This military population was of the usual age structure. They were mainly young soldiers, regulars and National Servicemen, in their late teens or early twenties, but with older N.C.O.s and officers. There was a fairly rapid turnover of the younger soldiers due to the release and new intake of National Servicemen but on the whole the general structure remained unchanged. There was one exception to this, in that during the first nine or ten months of the survey a fair proportion of German prisoners of war were present in the Tripoli area, however these were organized into units with British officers and lived under exactly the same conditions as British troops, the only possible difference was that their presence altered the ratio of officers to other ranks, as the P.O.W. units had relatively few officers.

Apart from the structure there was a gradual decrease in numbers during the first year, followed by a sudden and even greater increase with the arrival of troops evacuated from Palestine about the middle of 1948, which, after a period of stability, was in turn followed by another gradual decrease until the end of the survey.

METHOD OF INVESTIGATION

Infective hepatitis was a notifiable condition in the district. All cases were hospitalized in one major hospital, and for part of the time in one small station hospital. Hospital records, from the Admission and Discharge Book, were available from July 1947, whilst from early in 1948 it was possible to interview every patient and to record the salient points of his illness on a *pro forma* or questionnaire. The details recorded for each patient were: (a) name and number; (b) unit and sub-unit (company, squadron or battery); (c) nature of symptoms; (d) date of first onset of symptoms; (e) dates of admission to hospital and of discharge; (f) movements during incubation period of up to six weeks prior to admission to hospital; (g) details of any injections or blood transfusions during three months prior to admission to hospital; (h) dates of any previous attacks of hepatitis; (i) any other information which seemed of interest in certain cases.

Such questionnaires were completed for about 250 cases during the two-year period 1948-50. The data accumulated from both hospital records and questionnaires were tabulated and analysed, whilst the detailed study of certain individual questionnaires yielded additional interesting facts in several cases.

ANNUAL AND SEASONAL INCIDENCE

The epidemiological pattern of the disease was remarkably constant throughout the whole of the period under review. The incidence was negligible during the second quarter of the year and for at least some period during

this quarter, usually April and May, no cases were seen. A few scattered cases appeared about the middle of the year and continued sporadically until late August or early September after which time the epidemic wave increased rapidly to a maximum incidence, of about 4 or 5 per 1,000 per month, during October and November. There was a steady decline during December and January and by February the incidence was negligible again. The monthly incidence throughout the survey is recorded in Table I and is represented diagrammatically by fig. 1. the incidence is expressed as a ratio per 1,000 of strength and, with the full data available, there is no doubt that it portrays accurately the occurrence of the disease in relation to the population at risk at that time.

TABLE I.—INCIDENCE OF INFECTIVE HEPATITIS EXPRESSED AS A RATE PER 1,000 STRENGTH

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1947	—	—	—	—	—	—	0.25	0.52	1.94	5.52	4.13	4.86
1948	1.42	0.51	0.18	Nil	Nil	0.15	0.36	0.68	1.40	3.84	3.23	1.62
1949	1.09	0.33	0.22	Nil	0.23	Nil	0.35	1.33	1.94	2.02	4.01	3.37
1950	1.39	0.42	0.31	—	—	—	—	—	—	—	—	—

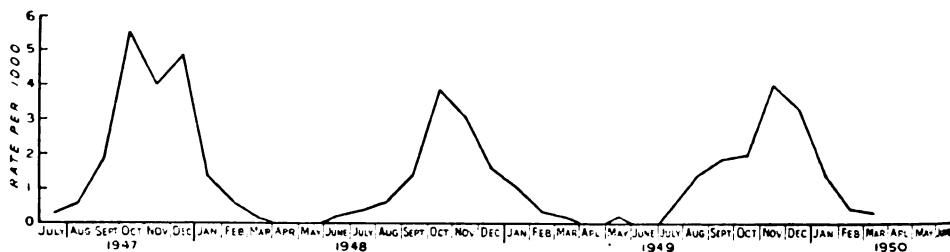


FIG. 1.—Infective hepatitis—monthly incidence 1947–50.

The annual incidence, also expressed as a rate per 1,000, was calculated using the annual total of cases and the average annual strength. Data for the two complete calendar years of 1948 and 1949 were available. These annual rates of incidence were not satisfactory and gave a quite misleading picture—the rate for 1948 was appreciably greater than for 1949 when in fact the two years were almost exactly similar. The reason for such a discrepancy is, of course, the occurrence of a relatively large variation in the population during the non-epidemic period when the population was not at risk—this happened during the first part of 1948 as already noted. The use of such an annual rate therefore is not considered to be satisfactory for comparatively small military populations which may vary in size during the calendar year. However, such a rate may be used as a rough guide provided all variations in strength are known. It can be stated that for British troops in Tripolitania during 1948 and 1949, the annual incidence of infective hepatitis was about 15 per 1,000 and during 1947 was probably about 20 per 1,000.

In view of the conflicting evidence as to whether the seasonal incidence of the disease corresponds to that of the respiratory diseases (droplet infection,

or to the excremental (water and food-borne) diseases, an attempt was made to relate the monthly incidence as recorded in fig. 1 to such diseases. In the first instance the relationship to the respiratory diseases was considered, and for this purpose data were collected on the incidence of the common cold, tonsillitis, acute bronchitis and influenza over a period of almost two years. Details of all such conditions, whether hospital admissions or cases seen at M.I. Rooms, were recorded and their total monthly incidence, expressed as a rate per 1,000 strength, is shown in Table II. It is considered that these figures give a reasonably accurate measure of the incidence of the respiratory diseases in Tripolitania. For purposes of comparison these respiratory diseases

TABLE II.—INCIDENCE OF RESPIRATORY INFECTIONS

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1948	—	—	—	—	—	—	27.6	32.1	31.9	34.8	50.5	45.7
1949	42.9	36.8	28.5	22.6	17.1	21.1	20.6	19.4	12.1	18.5	24.4	17.6
1950	30.6	14.0	—	—	—	—	—	—	—	—	—	—

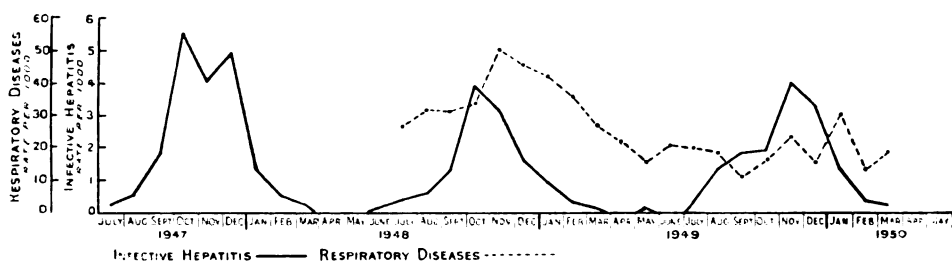


FIG. 2.—Comparison of infective hepatitis and respiratory diseases.

were superimposed on the diagram of the incidence of infective hepatitis as given in fig. 1, the result is shown in fig. 2 and it will be seen that there is not a close degree of correlation. The respiratory diseases would appear to vary considerably from year to year both as regards total incidence and seasonal periodicity, in striking contrast to infective hepatitis which was very constant and regular in both respects. Again, the seasonal peaks for the respiratory diseases were later than for infective hepatitis by about one or two months—a difference which must be increased still further if one takes into account the fact that the incubation period of infective hepatitis is at least a month longer. All these factors were carefully considered and it was concluded that there was not sufficient similarity between the two types of disease to warrant an analogy between their mode of transmission.

The next step was to compare the disease with an excremental disease known to be mainly water or food-borne. For this purpose the dysentery, diarrhoea group of diseases was rejected as being too definitely fly-borne, and the incidence of enteric group fever as it affected the civilian population was chosen. It was realized that in doing this one was considering a very different ethnic group from British troops, but it was argued that enteric fever in the local population

did take into account local conditions and would give a picture of the spread of a food and water-borne disease in an unprotected but partially immune community—which was precisely the state of the British soldier as regards infective hepatitis. In view of the fact that the local population varied very little in strength during the period under review the numbers of cases of enteric fever were recorded and not rates per 1,000. The result of such a comparison is shown at fig. 3 and it will be seen that there appears to be a definite similarity between the two as regards the seasonal rise and fall of the epidemic wave.

TABLE III.—INCIDENCE OF ENTERIC GROUP FEVER IN LOCAL CIVILIAN POPULATION OF TRIPOLI

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1947	—	—	—	—	—	—	1	44	30	15	11	11
1948	15	1	10	4	7	7	16	22	17	33	14	8
1949	3	3	2	1	1	10	12	32	19	21	6	5
1950	1	3	2	—	—	—	—	—	—	—	—	—

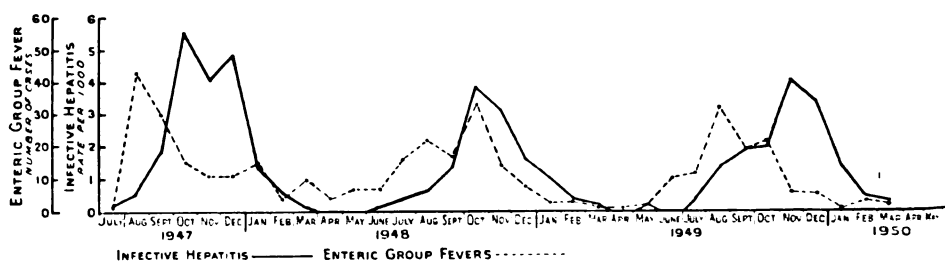


FIG. 3.—Comparison of infective hepatitis and enteric group fever.

The enteric fever, it is true, commences a month or more earlier on the whole but here again the longer incubation period of infective hepatitis probably plays a significant part. It would seem that such a comparison between these two conditions lends support to the conclusion that they have a similar mode of transmission. There is, however, one important fact which must be considered before such a conclusion can be justified. Whilst studying the similarities between these two disease patterns it became apparent that both were affected in the same way, and to a considerable degree, by climatic conditions, in particular by rainfall. Cases of infective hepatitis, for example, started to appear about three to five weeks after the winter rains had ceased, they increased to a peak during the period of drought and then declined rapidly from about a month after the winter rains re-commenced. There are some apparent anomalies to be explained and further work is needed; so it is considered that this aspect should be made the subject of another paper. An explanation is also required for the way in which the disease can vary so markedly between two such places as the desert country of North Africa and the tropical humid parts of West Africa where the excremental diseases

and infective hepatitis are more prevalent during the wet season (Findlay, 1948).

RELATIVE INCIDENCE IN OFFICERS AND OTHER RANKS

It has been a constant finding of all previous reports that in the British Army the incidence is greater in officers than in other ranks and this was again confirmed during the present survey. Officers accounted for 9.6 per cent of the total cases whilst their average proportion of the population at risk was about 5 per cent (4.8 per cent in 1947 rising to 5.4 per cent in 1949). On the other hand senior N.C.O.s, i.e. serjeants and warrant officers, accounted for 7.3 per cent of the total cases but their average proportion of the population at risk was about 8 per cent, these senior N.C.O.s therefore accounted for slightly less cases than the overall average level. The fact that the incidence in senior N.C.O.s was less than average is understandable in view of the known differential age incidence, but this of course would exaggerate still further the higher incidence in officers.

A detailed study of individual questionnaires was made, which showed that as a rule both officer and N.C.O. cases were limited to a small number of units during each epidemic period but the few units affected produced almost all the cases during that period, the remaining units escaping, for example:

(a) During 1947/48 out of 15 officer cases 11 were shared between 4 units only, whilst of 7 cases in senior N.C.O.s 4 occurred in one unit.

(b) In 1948/49 there were only 6 sporadic cases among officers and 6 among N.C.O.s—each case in a different unit. It is likely that the great disturbance of population after the evacuation from Palestine might have had some effect in this period.

(c) During 1949/50 out of 12 officer cases 8 were shared between 3 units, whilst of 12 cases in N.C.O.s 7 were shared between two units. These units had been out in a desert camp during the relevant incubation period where conditions were poor and the serjeants' mess in particular was found to be filthy. Incidentally, of the officers who contracted the disease 6 had been to this camp during the incubation period.

It would appear therefore that amongst officers and senior N.C.O.s the disease caused several cases in each of a limited number of units and none at all in most of the remaining units. There was a definite suggestion that the reason for this was the fact that officers and N.C.O.s lived or, even if married, spent a considerable proportion of their time, within the small compact groups of their respective messes, and once infection was introduced into such a group then several secondary cases would be caused. On the other hand such infection was not easily introduced, as is shown by the many units that escaped, nor could it be easily spread once introduced, as several units had single cases only. It was concluded that the mode of spread was related to the feeding habits of the group and was probably through the medium of infected crockery or cutlery, e.g. cups, glasses, spoons and

forks, which articles are usually shared by all members of the mess. It is suggested that when the first case occurs amongst officers or N.C.O.s no further spread takes place in about 60–70 per cent of instances but in the remaining 30 or 40 per cent some article of crockery or cutlery gets infected, probably from contaminated fingers, and then several secondary cases occur in each group. Such a method of transmission of the disease must be operative equally as regards officers and N.C.O.s, and indeed this seems to be the case.

One is therefore forced to the conclusion that in addition there is another factor in operation by which, with equal potentialities for spreading the disease in messes, officers are on the whole more susceptible than are senior N.C.O.s and by implication all other ranks.

SPREAD OF THE DISEASE IN INDIVIDUAL UNITS

Each unit was a self-contained community easily identifiable from records or questionnaires and more or less isolated from other units, certainly as regards daily living conditions. An analysis of the incidence by units was therefore carried out. It soon became apparent that in larger units cases occurred in "clumps" or "batches" and were not spread evenly over the epidemic period, such batches of cases always followed a small number of irregularly distributed cases which occurred during the early part of the season. In smaller units, cases, usually the only cases occurring in the unit throughout the whole three-year period, would occur all in one batch within a week or so, or even within a few days. The following examples have been extracted from the general series as being illustrative.

(a) *Unit A (A Guards Battalion).*—During 1948 this unit started off with 2 cases in early August, these cases were probably infected in Palestine before arrival in the territory. No further cases occurred for some five weeks and then 8 cases appeared at irregular intervals until the middle of November, when the following series occurred:

<i>Serial Number</i>	<i>Name</i>	<i>Date of admission to hospital</i>	<i>Sub-unit</i>
193	Gdsm. T	11 Nov. 1948	King's Coy.
195	" H	19 " "	2 Coy.
196	" F	19 " "	Support Coy.
197	L/Cpl. N	20 " "	" "
198	" G	20 " "	3 Coy.
200	Gdsm. T	21 " "	Support Coy.
201	" F	22 " "	" "
202	" F	22 " "	" "
203	" B	22 " "	" "
204	" B	23 " "	" "
206	" B	25 " "	H.Q. Coy.
207	" M	26 " "	" "
208	L/Cpl. H	26 " "	" "
211	Gdsm. L	28 " "	Support Coy.
212	" S	29 " "	" "
213	" A	3 Dec. "	3 Coy.

Only 5 further cases occurred, at irregular intervals, until the end of the epidemic period. It was ascertained that during the month of October the unit had been doing company training and companies had been out as sub-units in small camps during this period.

A similar but not so striking a series occurred in this battalion during 1949/50, however, it is not recorded owing to the possibility of fallacies arising from a mass yellow fever inoculation of the whole unit—this is noted below.

(b) *Unit B (a Regiment of Royal Artillery)*.—This regiment had only 2 cases during 1948/49. During 1949/50 there were 22 cases all within the period July to October when they suddenly ceased, just when the epidemic wave was at its height elsewhere. The cases were mainly grouped into three batches, in early August, late September and mid-October. The officer community was attacked early and produced several cases all of whom later infected their wives or children. It was first suggested by the medical officer of this unit that those who worked in offices were mainly affected and on further investigation it was found that some 60 per cent of those attacked worked in offices or stores.

(c) *Unit C (a Regiment of Royal Artillery)*.—During 1947 this unit had 25 cases from mid-September to late December, the officers were affected early and produced several secondary cases. From December 1947 until late 1949 when they left the territory this unit had only one further case although they remained in the same barracks throughout.

(d) *Unit D (a Highland Regiment)*.—This unit only arrived from U.K. in April 1949, the following record of its cases is particularly illustrative:

<i>Serial Number</i>	<i>Name</i>	<i>Date of admission to hospital</i>	<i>Sub-unit</i>
245	Pte. B	11 July 1949	D Coy.
263	" M	17 Sept. "	H.Q. Coy.
292	Lieut. F	5 Nov. "	Support Coy.
306	Major M	16 " "	B Coy.
308	Pte. McC	18 " "	H.Q. Coy.
318	Boy McK	2 Dec. "	" "
329	Pte. S	12 " "	" "
330	" S	12 " "	" "
332	" C	15 " "	" "
333	" S	15 " "	" "
334	Cpl. K	19 " "	" "
335	Pte. W	20 " "	" "
338	" R	21 " "	" "

only one further case occurred during the epidemic period. This unit was one of the units to inhabit the desert camp referred to previously and they were in this primitive camp for about four weeks during October/November.

(e) *District Headquarters*.—The numbers working at this headquarters made it a medium-sized unit with a disproportionately large number of officers and senior N.C.O.s. Throughout the three-year period this unit was at risk only. 11 cases were seen of which 7 occurred during an interval of fifteen days in September 1948:

<i>Serial Number</i>	<i>Name</i>	<i>Date of admission to hospital</i>	<i>Employment</i>
141	Dvr. D	4 Sept. 1948	M.T. Driver
146	Sjt. P	9 " "	Education Instructor
166	Gdsm. P	15 " "	Regimental Police
167	Cpl. P	15 " "	Armoury
168	Gdsm. B	16 " "	Batman
169	Pte. J	16 " "	M.T. Driver
174	L/Cpl. O	19 " "	Laundry
Two other cases occurred over a year later:			
336	Gdsm. E	20 Dec. 1949	Armoury
339	Pte. J	29 " "	M.T. Clerk

It must be regarded as remarkable that such a unit had no officer cases although the proportion of officers on its strength was vastly in excess of any other unit. It was observed that all of the affected men worked on routine unit duties and none worked in the headquarter offices, in addition all these men lived in barracks whereas in this unit a high proportion of all ranks were married and lived out in quarters.

Although all these instances have been chosen as being particularly illustrative there were many other similar cases in other units. It will be seen that during the span of each epidemic wave, the majority of cases in the larger units occurred usually over a limited period, and were undoubtedly secondary, or sometimes tertiary, cases infected from a common source. There probably was a limited amount of case-to-case infection but, with the long incubation period of this disease, the numbers of cases so infected must of necessity have been small, and would only become obvious at the beginning and end of each epidemic wave.

Another striking fact was the way in which those men working at or about the unit headquarters were most heavily attacked—men of H.Q. Coy. and Support Coy. account for about 80 per cent of all the cases recorded for Units A and D whilst in Unit B it was noted that 60 per cent of those affected worked in offices or around Regimental H.Q. At the District Headquarters those mainly affected were men working at domestic details in the Camp Commandant's department—the clerks and officers of the actual Headquarters were not affected at all, yet these should have been the most liable to droplet spread from the nature of their work in small and often crowded offices, whilst their number included a very high percentage (about 20 per cent) of officers in whom the attack rate is usually about double that of other ranks.

Another point observed when considering the incidence by units was that the incidence varied greatly in similar units and also would vary from year to year in the same unit. Thus Unit A had the highest rate throughout, Units B and C and District Headquarters had, at different times, a high incidence lasting for a comparatively short period, and then throughout the whole of the rest of the survey only odd cases occurred. There were other units too, both large and small, in which only odd cases were seen, occurring usually in twos and threes at intervals of four to six weeks but sometimes occurring quite

haphazardly, in which instance they were almost certainly infected from an outside source.

INFECTION IN HOSPITAL

As has already been noted, all cases were treated in hospital and the vast majority in one hospital. In addition to cases admitted with the disease, there were a number of proved hospital infections—patients who had come into hospital for some other condition and, after being in hospital for a month or longer, developed an infective hepatitis. In all, some 6 cases were proved beyond all reasonable doubt to have been so infected whilst 3 other cases were probably infected in hospital although other possibilities for infection elsewhere did exist.

It was noted that no cases occurred amongst the medical or nursing staffs (nursing sisters and R.A.M.C. orderlies) but amongst the non-nursing section of the hospital staff the incidence was about average, and here too it was noticeable that those who worked in offices or stores seemed to be more commonly affected than the rest.

It must surely be significant that although infective hepatitis patients could infect other patients in hospital the nursing staffs were never infected, and this fact above all others must weigh heavily against the hypothesis that pure droplet infection is the method by which the disease is spread.

MISCELLANEOUS OBSERVATIONS

The analysis of the questionnaires led to the accumulation of a great deal of data on various aspects of the disease which it is thought worth while to record briefly.

(a) Some 59 or 25 per cent of the sample questioned had received injections of one sort or another during the three months prior to the onset of their illness, such injections were usually for T.A.B. inoculation but a few had had penicillin or blood transfusions. In September 1949 one unit (Unit A) was inoculated *en masse* with yellow fever vaccine, some 15 subsequently developed infective hepatitis nearly all from one sub-unit, H.Q. Coy. The incident was carefully investigated with a view to proving a syringe transmitted jaundice but it was eventually decided that the injections had played no part in transmission in this instance.

(b) Two men admitted with infective hepatitis in February 1949 both developed poliomyelitis. The first (Pte. H) developed it on February 16, seventeen days after admission and died three days later. The other man who had been in the next bed to Pte. H for a few days was discharged, journeyed to Benghazi and there developed poliomyelitis on February 23, seven days after Pte. H. This was an unusual time of year to contract poliomyelitis in Tripoli and these were the only cases to occur at such a time during the whole of the period under review. It is possible that the infective hepatitis rendered one or both of these men more susceptible to the virus of poliomyelitis or that it

assisted in the activation of the latent virus. It might also be noted, in passing, that, although too few cases of poliomyelitis were seen to quote accurate figures, there was a definite impression that the method of spread of the two diseases was similar. The seasonal incidence was a little earlier in the case of poliomyelitis (July–September); but there was the same pattern, with cases occurring in twos or threes in the same unit, and in one instance of association with work in the office of H.Q. Coy.

(c) The time between the onset of the first symptoms and admission to hospital was on the average 4·3 days (S.D. 2·5 days).

(d) The duration of stay in hospital averaged 27·6 days (S.D. 11·4 days).

(e) The proportion who had had previous attacks was just 2 per cent, of whom about half had their attack within two months and were therefore probably relapses rather than second attacks.

DISCUSSION

There would appear to be two aspects of the disease on which this survey might yield information—the rate of incidence and the mode of transmission.

It was evident that the annual incidence although expressed as a rate per 1,000 strength was of little value, and could even be misleading, when applied to a comparatively small population whose number was liable to variation during a non-epidemic period. Possibly such a rate of incidence might be of value for a large and relatively stable population, such as a Command or a Theatre of Operations; but even in these instances the exact composition and numbers of the different ethnic groups would need to be known, and dealt with separately, if fallacies and misleading inferences are to be avoided. The only satisfactory way to compare the occurrence of the disease in different years is to record the seasonal incidence, expressed as a rate per 1,000, on a graph or chart. Such a chart should preferably show the monthly incidence, but a quarterly rate would be adequate in most instances.

By such a method it has been shown that amongst British troops in Tripolitania the disease is epidemic, with a regular epidemic wave during each autumn and early winter and a peak incidence, during October or November, of about 4 or 5 per 1,000.

The mode of transmission was studied in two ways. In the first place the seasonal incidence and epidemiological pattern of the disease was related to the respiratory diseases and to enteric group fever in an attempt to see whether it was possible to deduce, by analogy, a similar method of spread. In considering these attempts the significant factor must be the much longer incubation period of infective hepatitis; for, whilst all the data and the visual patterns of the charts deal with the disease from the time of admission to hospital, any consideration of the mode of transmission must necessarily be concerned with the time of infection, and this will be the date of admission referred back by the average duration of the incubation period. The time of infection must obviously be impossible of ascertainment in this type of approach but one can

say that, taking into account the differing incubation periods, the pattern of infective hepatitis approaches closely to that of the enteric group fevers whereas it differs considerably from that of the respiratory diseases, although in this connexion the influence of rainfall and humidity may be the operative factor in the causation of a similar pattern in these two diseases, and this aspect needs further clarification.

Consideration of the spread of the disease in individual units showed that, apart from the beginning and end of each epidemic period, the majority of cases in each unit occurred in one or two batches and were almost certainly secondary or tertiary cases infected from a common source. The average time between the onset of the first symptoms and admission to hospital was noted as being 4·3 days and it was up to seven or eight days in some cases, during this period the sufferer would be infective and would have ample opportunity to spread the virus. It was concluded that the disease was spread by oral ingestion of the virus, the vehicle for transmission could be food or water; but it is possible that, in the majority of cases, infection was spread through the medium of imperfectly washed crockery or cutlery in canteens, clubs, messes or even in offices (where cups or mugs are kept for the mid-morning or afternoon cups of tea and are invariably inadequately washed). It has been suggested that spread amongst office workers may have been caused by the handling of papers or documents with contaminated fingers, the virus remaining on the papers and later being conveyed to the mouth of a susceptible recipient by his own fingers. It will follow, too, that the medium or vehicle by which the virus is spread will to a certain degree determine the pattern of spread in any unit or group.

The survey has shown that the disease attacks certain groups or classes to a disproportionate degree, namely officers, all ranks of H.Q. and Support Coys. and possibly (although this is not so definite) those who work in offices or stores. The reasons for this are not clear. It is possible that, as all of these categories work in or around the headquarters of the unit, they have more opportunities for frequenting canteens or messes for extra cups of tea; whilst they are in addition a more constant grouping and may be in closer association than others of the unit. It has been suggested, too, that the men of these particular companies are, above all others, those who get the least exercise—they nearly all have sedentary jobs or drive mechanical transport, and it may well be that such lack of exercise is a predisposing factor. In this connexion it is worth recalling that in the Middle East in 1944 the relative incidence of infective hepatitis was highest amongst the Royal Army Pay Corps (Statistical Report on the Health of the Army 1943–45), the personnel of which work exclusively in offices and can get little exercise.

Whether the disease is spread through the agency of papers and documents or whether lack of exercise is a predisposing factor, there is little doubt that the greater susceptibility of officers is partly due to a lesser degree of exposure to the disease in infancy and early life with the result that they reach adult life

with a lesser degree of immunity. Only thus can it be explained why there is a very much different attack rate in officers and senior N.C.O.s with almost identical possibilities for introduction and spread of the infection within their respective messes. Indeed, by an extension of the same reasoning we can deduce the cause of the constant epidemic pattern of the disease, by postulating that the incidence of the disease is directly related to the sanitary standards of the community. Where these are low the disease is hyperendemic, occurs as a mild childish ailment and is not seen in adult life—it might even be that in childhood the disease does not produce jaundice: with the higher sanitary standards of Western Europe and North America the incidence is less and many escape the disease, but if large numbers of such an ethnic group are introduced into a hyperendemic region which has the appropriate climatic conditions, then the typical epidemic pattern will occur. Furthermore, whilst no evidence can be offered, there was a definite impression that diseases which have a similar behaviour and seem in some way to be comparable are poliomyelitis, atypical virus pneumonia and possibly glandular fever, especially in children. It is, however, stressed that such a similarity might only be true under local conditions of climate, especially rainfall, and in other circumstances these conditions would be spread in other ways, e.g. by droplet infection.

As regards preventive measures, the first essential must be the raising of the general sanitary level of the group under consideration, with particular emphasis on the highest possible standards of food hygiene and attention to all aspects of food preparation or storage. The personal hygiene of all food handlers is of the greatest importance, particularly the routine of hand-washing after every visit to the W.C. or urinal. Sterilization of water supplies must always be carried out, although doubt has been expressed as to whether chlorination, in ordinary dosages, is sufficient to kill the virus. In addition to all this, however, it is probable that the most important single measure will be the really efficient washing of all crockery and cutlery used in canteens, clubs or messes and the provision of adequate facilities for the soldier to wash his own utensils after a meal. Recent tests have shown (Frisby, 1950; and Higgins and Hobbs, 1950) that the fully efficient washing of crockery and cutlery should be carried out as follows:

- (1) Wash in really hot water (50° C.), to which a detergent has been added. This water must be changed at frequent intervals so that it is always hot and reasonably clean—the success of the process depends upon having little or no protein matter carried over from this stage.

- (2) Rinse in very hot water for one to two minutes, if necessary with the aid of racks, at a temperature of 85° C. or 185° F. Water sterilizing powder, 1 scoop per gallon could be added to this water, although it is not essential—the temperature is the important item.

- (3) Dry on a rack by draining and not by wiping with a cloth, which soon gets dirty and then can cause gross contamination of the article being wiped.

Such a routine, which may be called the "Wash, Hot Rinse and Drain" process

could be carried out at all canteens, clubs or messes, if some form of apparatus was provided to ensure the supply of hot water for rinsing. Its application to the soldier in barracks is less easy, even the present ineffective process of "wash, rinse and sterilize" is not done properly. The alternatives are either (a) to modify the "wash, rinse and sterilize" process by heating the water in either the rinsing or sterilizing compartment to 85° C. and maintaining it at this level, or (b) to discontinue the use of individual utensils for the soldier, in barracks at least, and to use all articles of tableware on a communal basis, to be washed centrally by the use of washing machines or with the use of various aids such as heated sinks, long-handled rinsing racks and drying racks.

SUMMARY AND CONCLUSIONS

A study has been made of infective hepatitis as it occurred among British soldiers in Tripolitania during the years 1947-50. Records of every case which occurred during this period were available, whilst during two of the three years it was possible to question every patient individually and so obtain much personal detail. The data thus accumulated were capable of being related to the population at risk with great accuracy owing to the availability of detailed strength figures. Study and analysis of this data brought out the following points:

(1) The annual incidence is an unreliable or even misleading figure when used for comparatively small military populations. Comparisons of different years can only be made from the perusal of monthly or quarterly rates, preferably represented on a chart.

(2) It was concluded that the spread of the disease in Tripolitania was excremental in origin and was transmitted by oral ingestion of the virus via water, food and especially articles of crockery or cutlery. It was also possible that spread could take place via papers, documents, office files or books.

(3) The incidence was greatest among officers, the personnel of H.Q. and Support Coys. and those who worked in offices or stores. Some possible reasons for this are discussed.

(4) It was concluded that apart from the mode of transmission, the most important factor in determining the occurrence of the disease was the susceptibility of the individual, which would seem to be influenced by the sanitary standards of the individual's environment during his early years. It is probable that this may be the chief factor which determines the greater incidence among officers.

(5) Some impressions were noted of the possibility of a similarity to, and relationship with, poliomyelitis, atypical virus pneumonia and glandular fever.

Finally suggestions were made for some preventive measures which could be adopted—mainly in relation to better kitchen hygiene and improved methods of washing crockery and cutlery using hot water to which has been added a detergent followed by rinsing in very hot water and allowing to drain dry.

ACKNOWLEDGMENTS

I would like to thank Major-General T. Menzies, *O.B.E.*, *K.H.P.*, Director of Medical Services, *M.E.L.F.*, for permission to forward this paper for publication and Dr. W. McC. Graves Morris, Director of Medical Services, British Administration, Tripolitania, for information in respect of the local civil population.

I am also grateful to Sjt. T. Jeory, *R.A.M.C.*, for a great deal of assistance in the recording and tabulation of data from hospital records, taking questionnaires from individual patients and also for drawing the charts.

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CORRECTIONS

SOME MEDICAL ASPECTS OF ATOMIC WARFARE

By Major A. LUNDIE, *Royal Army Medical Corps*

Vol. XCIV. May 1950

Page 250, line 11
should read

be expected *except* where

Page 253 (Hygiene and Atomic Warfare) 1st Para, line 5
should read

No *unauthorized*

Ref. 9 Kyusha should read Kyushu

ADDENDUM AND CORRECTIONS

Atomic Warfare

In our May number, Vol. XCIV, No. 5, 1950, an addendum to the article by Major A. Lundie, M.C., R.A.M.C., entitled "Some Medical Aspects of Atomic Warfare," was included under the heading—"Nuclear Physics Definitions."

This addendum was in fact a copy of a summary of the subject which had been compiled with considerable labour and great care by Major A. Fraser Anderson, Royal Army Medical Corps, in the Department of Army Health at the R.A.M. College. The addendum should, of course, have been produced as a separate article entitled—"An Introduction to Nuclear Physics, By Major A. Fraser Anderson," and our apologies are now made for this error.

Corrections.—In this addendum two misprints should be corrected.

(i) *On page* 256, paragraph "Heavy Hydrogen," line 5, for "88Ra," *read* "88Ra²²⁶."

(ii) *On page* 258, paragraph "Nuclear Fission," sub-paragraph 3, line 1, for "fission" *read* "fission."

Is it too much to hope that we may now receive other articles on this subject of present acute interest for publication in the near future?

Obituary

Major FREDERICK JOSEPH WILLIAM PORTER, D.S.O.

MAJOR F. J. W. PORTER died in Falmouth on June 4, 1950. He was born in Dover on April 17, 1867, and, after a distinguished career at the London Hospital, took the L.S.A. in 1889 and the M.R.C.S., L.R.C.P., in 1890, and was commissioned Surgeon Captain in July 1891. At Netley he took the Herbert Prize, the Montefiore Bronze Medal and the de Chaumont prize.

He was seconded for service with the South African Constabulary from July 1901 to February 1905; promoted Major, Royal Army Medical Corps July 1903 and retired in November 1913.

He took part in the South African Campaign 1899–1902; in the Relief of Kimberley; operations at Paardeberg, February 1900; actions at Poplar Grove, Kameel Siding and Zand River; actions near Johannesburg, Pretoria and Diamond Hill; action at Wittebergen, and operations in Cape Colony.

Mentioned in despatches he was awarded the *D.S.O.*, Queen's Medal with five clasps and the King's Medal with two clasps.

He was a man of outstanding character and forceful personality. He was a very keen surgeon and an expert operator. It is said that not an appendix within his reach was safe—not even those of his own children.

After retirement he practised in Bombay for a short time and later for many years in Tangier, Morocco.

Extracts from the "London Gazette"

HONOURS AND AWARDS

King's Birthday Honours: (L.G. 8.6.50).

C.B. Major-General Thomas Menzies, *O.B.E.*, M.B., K.H.P.

C.B.E. Colonel Richard Murphy, M.B.

O.B.E. Lieutenant-Colonel (temporary) John Mackenzie Matheson, M.D., M.R.C.P. Edin., F.R.C.S. Edin.

Lieutenant-Colonel (temporary) Annie Rowlands, *R.R.C.*, Q.A.R.A.N.C.

M.B.E. Captain Herbert Arthur Wood.

B.E.M. 7257861 Staff Sergeant Henry Bryce Glen.

Territorial Efficiency Decoration with 1st Clasp.

Colonel J. M. Smellie, *O.B.E.*

Lt.-Col. T. W. Preston.

Lt.-Col. R. L. Turner, *O.B.E.*

Major D. P. Holmes.

Capt. T. F. Jouning.

Territorial Efficiency Decoration.

Lt.-Col. W. R. Blunt.

Lt.-Col. (Hon. Col.) E. Bulmer, *C.B.E.*

Major R. Barraclough, *M.B.E.*

Maj. (Hon. Lt.-Col.) J. McL. Cobban.

Maj. (T/Lt.-Col.) W. Gibson.

Major E. H. Hanson.

Maj. (A/Lt.-Col.) F. J. Manning.

Maj. (A/Lt.-Col.) O. G. Prosser, *M.C.*

Major N. G. G. Talbot, *O.B.E.*

Maj. (Hon. Lt.-Col.) H. E. W. Waters.

Maj. (A/Lt.-Col.) A. Willcox.

Capt. (Hon. Maj.) A. S. Anderson.

Capt. (Hon. Maj.) J. A. R. Johnson.

Capt. (Hon. Maj.) P. M. Lissack.

Capt. (Hon. Maj.) D. W. E. Lloyd, *M.C.*

Capt. (Hon. Maj.) M. Park.

Capt. (Hon. Maj.) G. Punshon.
 Capt. (Hon. Maj.) D. E. Ross.
 Capt. J. K. Sugden.
 Capt. (Qr.-Mr.) (Hon. Maj.) C. V. Jefford, *M.B.E.*
 Lt. (Qr.-Mr.) T. Hynes.

Major-General John Mandeville Macfie, *C.B.E.*, *M.C.*, *M.B.*, is appointed Honorary Surgeon to The King, 29th March 1950, vice Major-General Rudolf William Galloway, *C.B.*, *C.B.E.*, *D.S.O.*, *M.B.*, retired.

PROMOTIONS

(1) *R.A.M.C.*

(a) To be Lt.-Col.:	
Major R. D. Menzies, <i>M.B.</i>	3.6.50
(b) To be Major:	
Capt. P. J. C. Burton	12.6.50
(c) To be Capt. (S.S.C.):	
Lt. W. E. Clifford	29.5.50

APPOINTMENTS TO REGULAR ARMY AND SHORT SERVICE COMMISSIONS

(1) *R.A.M.C.*

- (a) Major J. Aitchison, *M.B.*, from Reg. Short Service to be Major 24.4.50, retaining present seniority.
- (b) Lt. William Eric Clifford from National Service List to be Lt., 10th May 1950, retaining present seniority.
- (c) Lt. Eric John Gammon from National Service List to be Lt., 28th Apr. 1950, retaining present seniority.

RETIREMENTS

(1) *R.A.M.C. (Short Service Commissions)*

Capt. J. Prentice, <i>M.B.</i>	29.5.50	
Capt. J. M. Hughes, <i>M.B.</i>	10.6.50	(Hon. Major)
Capt. I. W. Clark, <i>M.B.</i>	"	(Hon. Major)
Capt. W. Brodie, <i>M.B.</i>	"	
Capt. J. Carswell, <i>M.B.</i>	"	
Capt. D. A. Chadwick, <i>M.B.</i>	"	
Capt. T. Dungavel, <i>M.B.</i>	"	
Capt. J. MacLean, <i>M.B.</i>	"	
Capt. W. G. L. Allan, <i>M.B.</i>	"	
Capt. H. Benson, <i>M.B.</i>	17.6.50	
Capt. N. C. Rees, <i>M.B.</i>	19.6.50	
Capt. J. O. S. Anderson, <i>M.B.</i>	17.6.50	
Maj. J. C. Scott	25.6.50	
Capt. R. P. Hickey, <i>M.B.</i>	26.6.50	(Hon. Major)
Capt. D. S. Cranston, <i>M.B.</i>	10.6.50	
Capt. I. Lamond	25.6.50	
Capt. D. R. Patchett	27.6.50	

Reviews

RESUSCITATION AND ANÆSTHESIA FOR WOUNDED MEN. By Harry K. Beecher. A.M., M.D. Springfield, Illinois: Charles C. Thomas. Pp. 161. Illustrated Price £2.

This book is clearly the outcome of the author's practical experience in resuscitation and anæsthesia for battle casualties.

It depicts very clearly the psychological, clinical and physiological changes which may occur in the recently wounded, and on this basis describes the methods necessary to effectively counteract these conditions. The book contains in detail most of the lessons in the resuscitative treatment of the wounded man learned during the recent war.

The final section on anæsthesia for the wounded is sound but such dogmatisms as "Ether is the choice in the seriously wounded" will not find universal agreement.

Dr. Beecher's book is an important contribution to the current literature on War Surgery.

K. F. S.

EMERGENCY SURGERY—PART III. By Hamilton Bailey assisted by N. M. Matheson. John Wright & Sons Ltd. To be published in 5 parts.

This Part III, of 165 pages, deals with the emergencies arising from affections of the rectum and anus and male and female genito-urinary tracts: and includes chapters on abdominal emergencies in the tropics, post-operative complications—fæcal fistulæ and phlebothrombosis. The text and illustrations are as helpful and instructive as in the previous parts and editions of this valuable publication.

A. G. H.

OSTEOPATHY AND MANIPULATION. By James Cyriax. Crosby Lockwood & Son Ltd.

An easily read manual which explains clearly the present claims of osteopaths and chiropractors: and discusses fairly to what degree these claims are, or are not, substantiated.

The author's aim is to present the facts without *bias*, so that an interested layman can make up his own mind. He makes the sound proposal that orthodox medicine should recognize the value of manipulative therapeutics—which in future should be taught to graduates of a recognized body of medical auxiliaries, such as chartered Physiotherapists.

A. G. H.

CASUALTY FAKING. By Ernest James Ward. British Red Cross Society. Price 4s.

This is a small handbook, costing 4s., by Mr. E. J. Ward of the City of London Branch of British Red Cross Society, giving full guidance and adequate illustrations of the art of faking casualties and wounds. With the aid of a few sticks of grease paint, a bit of putty, some adhesive plaster and a few odds and ends, instruction and practice in first aid can be made very much more natural and interesting.

A small handbook of great interest and value to any whose duties or inclinations lead them to the teaching and demonstration of first aid.

A. G. H.

ANATOMICAL ATLAS FOR THE STUDENT. By Dorothy L. Holland, S.R.N., S.C.M., D.N. Nursing Mirror. Price 2s. 6d. net.

A handy record of information given in coloured diagrams which would otherwise be obtained from blackboard diagrams and wall charts.

It is always difficult to decide how much to include in these diagrams for elementary students, but a number of points will give rise to some confusion, e.g. the peculiar X-shaped attachments figured of hamstrings and gastrocnemius, with an enclosure suggesting a patella behind as well as in front of the knee (fig. 2, page i); the aorta on the right side of the vertebral column (fig. 1, page v); the absence of any lymphatic glands in the chest (fig. 5, page v); and the duodenum opening into the colon (fig. 1, page iii).

It might be preferable to colour the soft palate (fig. 3, page iii, and fig. 1, page iv) the same as the tongue; and to avoid the impression given in these two diagrams, that the œsophagus forms a continuous blue tube from the palate across or through the pink pharynx. The section through the heart (fig. 3, page v) would be more easily comprehended if the portion of the lines, showing the blood stream from left ventricle to aorta, were omitted where the stream passes behind the blue pulmonary artery. It is only in the older age-groups that the male prostate is large enough to cause hypertrophy of the male bladder wall, to three times the thickness in the female (figs. 1 and 5, page viii).

These slight inconsistencies are unavoidable in blackboard diagrams, but would be better absent from a permanent record designed for later study.

If these are avoided in subsequent editions, the atlas will be found to be a valuable asset for nurse students and nursing orderlies.

A. G. H.

BENNETT'S MATERIA MEDICA AND PHARMACY FOR MEDICAL STUDENTS. Fifth Edition. By Reginald R. Bennett, B.Sc., F.R.I.C., revised by H. G. Rolfe, B.Sc., F.R.I.C. London: H. K. Lewis & Co. Ltd. 1950. Pp. 276. Price 16s.

This is a guide to the British Pharmacopœia, materia medica and pharmacy. It contains much that is required for trade examinations in the Army. definitions, notes on plant constituents, weights and measures, dosage tables and notes on incompatibility. Its convenient size will recommend it to candidates preparing for examination and for subsequent reference use.

J. B.

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Journal of the Royal Army Medical Corps.

Xmas, 1950

FROM THE D.G.A.M.S. TO ALL RETIRED OFFICERS

*I send by means of the Corps Journal, my hearty greetings and good
wishes for Xmas and the New Year to all retired officers of the Corps.*

Original Communications

BLACKOUTS

BY

A. BARHAM CARTER, M.D., M.R.C.P., D.P.M.

Adviser in Neurology to the War Office

DURING the last ten years, there appears to have been a considerable increase in the number of people complaining of "blackouts" and this increase has been particularly noticeable in the Armed Forces. The present small survey is an analysis and study of those soldiers complaining of "blackouts" who were seen in the Neurological Department of three military hospitals from April 1947 to April 1950.

These cases will be considered from the point of view of diagnosis, disposal and treatment. The prognosis is unfortunately uncertain in these cases because of the numerous difficulties of follow-up in this type of case.

MATERIAL

The total number of out-patient cases seen in this period was 1,344 and of these as many as 530 complained of "blackouts." This high figure, almost 40 per cent, will cause no surprise to those medical officers to whom troops report sick initially, as the complaint of "blackouts" has become very popular in the Army. It may, however, surprise these same medical officers to know that only 2 cases were finally diagnosed firmly as malingerers. By far the greater number

of malingerers were screened from these hospital clinics by the Regimental Medical Officers and their N.C.O.s.

Of these 530 patients, 409 were National Service men and 23 had rejoined the colours having been invalided out of one of the Services previously. Of these 23, 20 had concealed their previous history and 3 had told the facts to the Recruiting Tribunal with no noticeable effect. There were only 16 women in the series and the analysis of their complaints did not differ materially from that of the men.

TABLE I.—ANALYSIS

	<i>Nos.</i>	<i>Per cent</i>	
Psychoneurotic attacks	240	45·4	
Syncopal attacks	120	22·7	
Epilepsy—major	90	113	21·2
" minor	8		
" traumatic	5		
" other types	10		
Migrainous attacks	26	5·0	
Aural vertigo	23	4·3	
Vasovagal syncope	6	1·0	
Hypoglycæmic attacks	2	0·4	
Total	530	100	

The vagueness of the term "blackout" and the speed with which such a complaint can infect a number of men make it highly desirable that a quick and accurate clinical evaluation of this symptom be made, preferably without the expense of recondite investigations and without the patient having to pass through the hands of more than one or two specialists before disposal action is taken.

DIAGNOSIS

Since most of these cases show no abnormal physical signs in the central nervous system, the history is all-important, and because the statements of the patient or his friends or relations may not be completely reliable, it is essential that an independent written account of one or preferably two attacks should accompany the patient to the out-patients' clinic. This insistence on factual evidence may seem unnecessary to the medical officers who refer the cases, but it has been sufficiently helpful and important to be adopted in my civilian neurological clinics.

There are two proformata—one rather more elaborate than the other and I am grateful to Dr. Ritchie Russell for permission to reproduce these (*see* Appendices I and II). Proforma A is used by me in simple differential diagnosis as to epilepsy or not epilepsy, and Proforma B is perhaps more important if the question of post-traumatic epilepsy arises. It has been a salutary lesson to me to see how accurate a record of a fit a medically-untrained soldier can give, even when he has never seen or heard of convulsions before.

The main diagnostic points which have been found most useful will be described briefly under the heading of each condition encountered.

EPILEPSY

Major Epilepsy.—These patients usually say that the attacks come on suddenly, often without warning, occurring when they are lying down as well as standing up; they do not remember hitting the ground when they fall, and often when they come round do not even realize they have had a fit, although awareness of this soon makes itself felt. Many attacks occur before breakfast, and cleaning the teeth seems to be a frequent precipitating event.

The pattern of the fit itself is too well known to need description, and its effects are generally sleep, mild confusion, headache, and in some cases automatic behaviour. In this series, the length of unconsciousness was very constant for each patient after his fit.

A little more than half of the patients with *grand mal* attacks gave a history of definite aura before their convulsions, and the types seen in this series were auditory, visual, visceral and sensory in that order. For each patient the type of aura is usually constant, thus differing from syncopal attacks, and even more from psychoneurotic attacks, where the premonitory symptoms are very variable for each patient. Two of the *grand mal* cases gave a history of emotional feelings of apprehension and terror before the attack.

Minor Epilepsy.—Although many cases have been referred as *petit mal*, only very few of them fulfilled the required conditions.

True *petit mal* begins in childhood and is characterized by sudden attacks of transient loss of awareness of surroundings and without the patient falling to the ground. Anything held in the hand may be dropped and continuity of speech is interrupted. There are no premonitory sensations and no sequelæ to the attack, although sometimes hysterical behaviour may ensue and add to the diagnostic difficulties. I do not believe that this condition leads to mental deterioration, but obviously the constant distraction of frequent attacks interferes with normal mental attention and education.

This is one of the few subdivisions of "blackouts" where electroencephalography is found useful and reliable: on overbreathing an abnormal discharge is seen in the EEG with a wave and spike complex. If the attacks occur frequently this abnormality may occur in the EEG record at all times. However, only if the clinical evidence is at all convincing or suggestive should an EEG be undertaken, as it is never a short cut to correct diagnosis.

Traumatic Epilepsy.—Many patients have complained of "blackouts" following closed head injuries of varying severity in childhood, but only 5 of these have been thought to be cases of traumatic epilepsy.

Most of the other cases represent psychoneurotic attacks comprising the so-called "post-concussional syndrome" of undue mental fatigability, postural vertigo and headache, as well as pseudo-syncopal attacks and hysterical convulsions. Some others, where there was no doubt about the convulsive nature

of the attack, are cases of constitutional *grand mal* with a coincidental history of head injury in childhood.

Of the 5 cases accepted as post-traumatic epilepsy, 2 have a history of penetrating brain injury and the other 3 of severe closed head injury with post-traumatic amnesia longer than one week. 3 out of 5 start their attacks with focal manifestations, and 2 have focal abnormal electroencephalographic discharges.

Epilepsy (other forms).—These comprise 10 cases and include Jacksonian epilepsy, akinetic attacks and psychomotor epilepsy. There is no need to describe the Jacksonian attack with its constant focal onset and march over the body. In this small series, it always meant an underlying organic brain lesion.

Akinetic attacks were probably *grand mal* epilepsy without the tonic or clonic phases of the fit. The patient would fall suddenly to the ground and lie still. Consciousness was lost and then, after a variable time but always within three or four minutes, the patient would suddenly come round. It could be distinguished from syncope by its sudden onset without warning, occasional urinary incontinence and normal pulse-rate and pulse volume during the attack.

Psychomotor epilepsy, of which only one case was seen, consists of attacks in which the patient does not lose consciousness but appears to become confused and begins to do complicated automatic actions like putting on his coat and hat and going out for no apparent reason or undressing and going to bed in the middle of the morning. This condition usually has a characteristic EEG record.

To recapitulate, the diagnosis of epilepsy rests on the clinical history and on direct independent observation of the attacks. One convulsion does not justify a label of epilepsy, which must in any case be applied only after very careful consideration of all factors. A man may have a fit when returning to his unit from leave after a celebration the night before and a long hungry train journey, often standing up the whole way. This should not be called epilepsy but convulsion N.Y.D.

The widespread use of the EEG in the routine diagnosis of "blackouts" is to be condemned because of its limitations. Probably 20 per cent of epileptics have a normal record between attacks, and abnormal records are not uncommonly obtained in patients who have no convulsions. Therefore the EEG cannot be used to say whether a patient who has had a "blackout" is or is not suffering from epilepsy.

The family history is also a dangerous foundation on which to rest the final diagnosis, because a positive close family history of epilepsy cannot decide where the patient is in fact an epileptic and moreover may give greater opportunity for the patient to simulate the seizures that he has seen at home.

Provocative tests are also to be condemned. All they show is the threshold at which any given patient can be made to have a fit, and this obviously bears

no relationship to the occurrence of fits in his normal environment. If we believe in provocative tests we should logically go to the extreme adopted by the army of a certain European power where, I understand, all men complaining of "blackouts" are given a small dose of intravenous cardiazole. Those who have a fit are discharged and those who do not are imprisoned for malingering. I believe the incidence of "blackout" is minimal in that country's army.

SYNCOPE (VASOMOTOR FAINTING)

These patients say that their attacks come on when standing up, or less often sitting up, but never when lying down. They are brought on commonly by long standing, sudden alteration of posture, fatigue, hunger, excitement or exertion in hot weather and are commonly preceded by a variety of bodily sensations. These are often visual with blurring or blackness of vision, but other variable somatic feelings encountered are weakness of the knees, coldness, dizziness, emptiness of abdomen, clammy sweating and apprehension. Many of these patients can get to a chair or prevent injuring themselves before they "pass out," although some fall straight down like a log. They are pale in the face and lie still and none of this series has shown evidence of the convulsive movements which sometimes follow prolonged syncopal attacks. On coming round, these cases feel weak and are helped by keeping the head low, none has shown automatic behaviour after an attack and none has been incontinent. Mostly, these patients are young weedy-looking men of asthenic body type with cold extremities and often present with a marked secondary anxiety.

During the attacks the pulse is usually slowed and of very poor volume, as the cause of the unconsciousness is cerebral anoxæmia due to sudden fall in systolic blood pressure.

PSYCHONEUROTIC ATTACKS

These were the commonest cause of "blackouts" and presented in many ways. The mildest form was described as an attack in which "things go round," "everything seems blurred," "dizzy spells come on," "I come over funny," etc. These attacks did not produce falling but the patients had to sit down. They were commonly brought on by excitement, worry or noise, and always were associated with what the patient thought was an unpleasant environment. Common precipitating factors were "officers shouting at me," "square bashing," "noise of the workshops," and "P.T." (physical training). The feelings of these patients about their environment was indicated by the fact that not one of them played any form of sport in the unit to which he was attached. It was very difficult to distinguish this sort of reaction from malingering: even the most liberal judgment had to make this diagnosis in 2 cases.

The second type of psychoneurotic attack was the syncopal type in which the patient would "pass out" after a variety of premonitory feelings. These feelings were described as "terrible," "I feel I am going to die," "I am sinking down and down," etc. The patients usually sank to the ground and were able to save

themselves from injury. Their unconsciousness was rarely complete: they said they could hear people talking although they could not even see what was going on around them. The length of time of each attack was variable, some saying that they would lie there "unconscious" until someone came to rouse them up. One such case told me that he lay like this for nine hours before someone came to find out what had happened to him.

The third type of psychoneurotic attack was the hysterical convulsion. The onset of this was usually dramatic: the patient, always in company, would begin to attract attention to himself by making some sort of noise, would throw himself to the ground, often with outstretched hands, and begin to thrash about on the floor, kicking wildly, irregularly and often purposefully at anyone or anything within reach. He would resist attention, be red in the face and his closed eyes would resist opening. Severe painful stimuli will often stop an attack, but are better not indulged in as these patients may be pain insensitive or may complain of the injuries caused by these manœuvres; in any case the best treatment of such an attack is to push the patient to one side and act as if he were not there. An occasional remark as to the advisability of drastic and unpleasant sounding treatment is allowable and may bring an attack to an abrupt close. Incontinence is rare, but I have seen one hysteric break his nose falling in a fit and one throw himself on the fire—both undoubted hysterics.

The fourth type of psychoneurotic attacks, and many may not consider these entirely emotional in origin, was the post-concussional syndrome which was encountered in patients complaining of "blackouts" and often with the provisional diagnosis of traumatic epilepsy. These cases as far as this series is concerned, had a history of head injury previously which was usually trivial or any way mild in its effects judged by length of post-traumatic amnesia. The attacks began very soon after the injury and were associated with "head consciousness" and headaches, so that the patient was frightened of moving his head at all. Many of these patients showed evidence of other personality defects and had been unstable in their previous social relationships. The attacks on close questioning usually resolved themselves into a mixture of simple postural vasomotor fainting or vertigo and psychoneurotic syncopal attacks. Anxiety was constantly seen, and unfortunately only too often implanted by unwise medical statements at the time of injury. Even the simplest request to "be careful of your head" seems to result in head consciousness in many of these patients with disastrous psychological consequences. Young patients with closed head injuries and no evidence of brain injury must be firmly reassured that recovery will be complete and that normal head movements are essential to this recovery.

The diagnosis of any type of psychoneurotic attacks rests on the clinical description of the attack itself as outlined above, on the positive assessment of the immediate emotional precipitating factors of such an attack and on other general evidence of the patient's unstable emotional drives and inability to

live in harmony with his surroundings or to face the consequences of his behaviour. Any other methods of diagnosing psychoneurotic illness such as the absence of physical signs, the dislike of the patient's manner or appearance and vague unspecified abnormalities in his EEG record, are highly dangerous and likely to lead to error even in the hands of otherwise competent observers.

MIGRAINOUS ATTACKS

To my surprise 26 cases which I accepted as migraine were sent to me complaining of "blackouts." No further history had been taken apparently by the officers referring these patients. The patient really meant that he had experienced a transient blurring of vision, sometimes hemianopic in distribution, sometimes accompanied by the classical teichopsia of migraine, followed by headache and nausea or vomiting. The headache was not commonly a hemicrania, although one side of the head sometimes ached more than the other. The attacks were fairly constant in frequency and duration, coming on in early adolescence and very often made worse by the anxiety and physical strain of National Service.

AURAL VERTIGO

These patients meant by "blackouts" that they experienced subjective or objective feelings of forced rotation. Occasionally, the attacks were sufficiently severe to cause falling but consciousness was never lost. The attacks were labyrinthine in origin, most of them associated with simple vasomotor instability, but some were infective and a few showed the true Menière's syndrome of increasing unilateral receptive deafness, tinnitus worse with or just before each attack and fairly regular attacks of objective vertigo and vomiting.

It must be mentioned that sometimes this type of vertigo is in fact an epileptic aura, and sometimes a migrainous manifestation.

VASOVAGAL ATTACKS

I have reserved this term for the rare cases of prolonged syncope (fifteen to thirty minutes) associated with sweating, marked bradycardia and lowered blood pressure. This conforms with the original use of the term by Gowers, which has been somewhat overshadowed and forgotten in the more recent application of the term by Lewis to cases of simple vasomotor syncope. I think the figure of 1 per cent I have found in this series is unduly high, and I doubt whether my diagnosis was correct in all the 6 cases I have accepted under this heading.

HYPOGLYCÆMIC ATTACKS

Two cases of hyperinsulinism were encountered, one with epileptiform convulsions and one with syncopal attacks. Both gave the characteristic story of onset when hungry, prodromal feelings of uneasiness and apprehension, marked sweating and bodily sensations of weakness and trembling. The case with convulsions required partial pancreatectomy and the other responded to increased and more frequent carbohydrate intake.

DISPOSAL AND TREATMENT

The management of cases presenting as "blackout" is so diverse that it is advisable to consider this under each diagnostic heading.

Epilepsy.—Once a firm diagnosis of *grand mal* has been made the patient should be recommended for invaliding out of the Service, category P8 with the final diagnosis of *Epilepsy Major Constitutional*. I am convinced that it is unwise to disregard this rule except in the most unusual instances. Once the decision to invalid has been made, he should be given phenobarbitone, 1 grain. b.d. and told to report through his civilian doctor to the nearest neurological centre. Cases of *petit mal* should be dealt with in the same way, except that the word Major should be replaced by Minor and no anticonvulsant given. Tridione should only be used under strict neurological supervision.

Traumatic epilepsy and other types require similar handling, although key personnel in the Regular Army may sometimes be retained in a low medical category particularly if they have suffered penetrating brain lesions and have made a good recovery. I know of two or three of these patients whose epilepsy is controlled on phenobarbitone and who are doing a very good job of work. Each case requires a separate judgment.

If the diagnosis of *Convulsion, N.Y.D.* is made on a history of one attack of *grand mal* or perhaps two attacks with a year's clear interval between them, the patient should be placed in Category P6 or P7, NOT TO DRIVE AND NOT TO HANDLE LETHAL WEAPONS. He should not be given anticonvulsant therapy and any further witnessed attack should be carefully recorded and sent with the patient to a neurological specialist. He should be told to avoid any situation that might endanger him should an attack occur, and any known precipitating cause.

Syncopal Attacks.—These sometimes present difficulties. Usually the patient is told that the attacks are fainting attacks and that he needs to continue with his military training to become sufficiently fit physically if he ever hopes to lose them. He is told that bending his head down will often prevent the full development of the attack and if he cannot do this owing to his circumstances, strong contraction of the abdominal muscles will do the same. He is returned to his unit for full duties and, if a driver, is relieved of this duty. Admittedly an occasional fainting attack is not sufficient to make a man unfit to drive but I err on the side of caution unless I am sure he always has sufficient warning to stop his vehicle safely before an attack occurs. No change is recommended in medical category.

Sometimes this method succeeds and sometimes the patient is referred back in a month with his attacks more frequent. I again require witnessed records of these attacks before action is taken. If the diagnosis of frequent syncope is confirmed and physical examination (including chest X-ray and urine testing) is negative, I find that ephedrine, $\frac{1}{2}$ grain t.d.s. is worth trying, or even the simple remedy of smelling salts (spiritus ammon. aromat.) is occasionally successful. Firm reassurance that his brain is normal is always necessary for

this type of case. If all else fails observation in a military hospital and a psychiatric opinion may disclose that the man is a misfit in his regiment and that downgrading and a change to a sedentary job are necessary to clear up the attacks. These remarks apply only to those cases finally diagnosed as syncope, where epilepsy and major psychoneurosis have been excluded.

Psychoneurotic Attacks.—The milder cases are reassured, some simple explanation of their illness in relationship to environment is given, and if tension symptoms are present a sedative is prescribed such as phenobarbitone, secenal or sodium amytal. This should be continued in small doses for two to three months as the power of suggestion thereby obtained is very strong. I do not believe patients become addicted this way to these particular therapeutic agents, nor have I known the slightest harm to occur from this line of treatment. The patients are returned to full duty. If no improvement occurs and the attacks become severe a psychiatric opinion must be obtained. This type of case is very unsatisfactory as any honest attempt to get these fellows to believe that Army life in itself may help them get well, is usually met with by a ministerial enquiry set in motion by the relatives. Hysterical convulsions should always be referred for a psychiatric opinion because they represent a marked degree of mental dissociation.

The post-concussional syndrome requires considerable patience. Somehow, one has to get across to the sufferer the necessity of moving his head about and of working on through his headache. The time to do this is shortly after the injury, and head exercises should be started almost as soon as consciousness is regained. However, many patients come up with "blackout" some time after their injury, and all one can do is to explain to them that keeping their head still and developing "head consciousness" are the causes of their complaints, and that therefore it is worth trying the reverse to get well. Again, as in the psychoneurotic patient with "blackouts" the constant wish to avoid military service often makes the therapeutic attempts of very little use, and downgrading with P.T. excused is often the only sensible answer.

Migraine.—There is no need to describe here the routine treatment of this condition. I sometimes find nicotinic acid helpful, either to abort an attack or for use between them. Mild cases need little more than codeine for the headache and fresh air and exercise and should not have their category lowered. Moderate cases are best recommended for P5 or P6 category as tropical climates may make them severe. In some severe resistant cases, I have had to recommend invaliding from the Service. The word *migraine* should be reserved for cases conforming with the generally accepted description of the condition and not for any sort of head pain in soldiers.

Aural Vertigo.—The milder forms of labyrinthine vertigo responded to sedatives such as phenobarbitone or very small doses (1/200 grain) of hyoscine hydrobromide, and advice as to avoidance of sudden change of position. Moderate cases were helped by this treatment but needed downgrading to P5, 6 or 7 according to the severity of the attacks: only very few were invalided out.

Every case of aural vertigo that gives any disability at all should be treated by fluid limitation. Urea 15 grains is given t.d.s. for one week, b.d. for the second week and daily for the third and subsequent weeks. At the same time, fluid intake is limited to 40 oz. in twenty-four hours. This unpopular treatment is often very effective, but difficult to implement.

Vasovagal Syncope; Hypoglycæmic Attacks.—These cases will probably always require invaliding from the Service.

CONCLUSIONS

“Blackouts” are a common complaint in military neurological clinics, and need reasonable care in diagnosis, disposal and treatment. History and evaluation of the symptom are all-important and an extra ten minutes at the interview may mean months of saving in cross references and hospitalization. This applies to medical officers seeing the cases for the first time as well as to the neurologist, and the small size of the 256A is no excuse for negligently cutting short the history to such things as “*Blackouts ??: please advise.*” No case should be referred without a written record of the attack, signed and witnessed by a reliable observer. The EEG has very little place and is of very limited value in the differential diagnosis and I think may do harm by encouraging lazy clinical assessment and examination and by wrongly labelling patients.

APPENDIX I

PRO FORMA A.

REPORT BY WITNESS ON A CASE OF SUSPECTED FITS OR FAINTS

1. Name
(Time and date of attack).
2. What was the patient doing immediately before the attack occurred?
Was he standing, sitting or lying down?
Was he excited, upset or calm?
What was the first abnormality noticed?
3. Give a general description of the attack.
4. In addition to the general description given above, the following questions should be answered, if possible.
 - (a) Onset sudden or gradual? Did he fall? Did he injure himself? Did he make a noise or cry out?
 - (b) Did he appear to lose consciousness, e.g. could he be roused by shouting or pinching? Did he blink when his eye was lightly touched?
If unconscious, for how long?
 - (c) Colour of face, e.g. pale, flushed, blue or natural?
 - (d) Eyes open or shut? If shut, could eyelids be opened by the observer?
 - (e) Did the limbs become stiff or remain loose?
 - (f) Did any movements of the body occur? If so, describe them and their duration.
 - (g) Was the tongue bitten or was the saliva coloured with blood?
 - (h) Was there incontinence of urine or feces?
 - (i) Pulse.
 - (j) Condition after the attack, e.g. headache, vomiting, confusion, sleep, peculiar or automatic, crying or other emotional disturbances.

5. Further observations and opinion regarding nature of attack (continue overleaf if necessary).
6. Name of witness on whose observations this account is based.

Date and Time..... *Signed*.....

M.O.'s Comment.

APPENDIX II

PRO FORMA B.

REPORT BY WITNESS ON A CASE OF SUSPECTED FITS OR FAINTS

Patient's Name

Some of the questions may be better answered by the patient himself.

1. (a) Time and date of attack.
2. What was the patient doing immediately before the attack occurred?
Was he standing, sitting or lying down?
Was he excited, upset, or calm?
What was the first abnormality noticed?
3. Give a general description of the attacks, including any warning the patient had.
4. In addition to the general description given above, the following questions should be answered if possible:—
 - (a) Onset sudden or gradual? Did he fall? Did he injure himself? Did he make a noise or cry out?
 - (b) Did he appear to lose consciousness, e.g. could he be roused by shouting or pinching? Did he blink when his eye was lightly touched? If unconscious, for how long?
 - (c) Colour of face, e.g. pale, flushed, blue or natural.
 - (d) Eyes open or shut? If shut could eyelids be opened by the observer?
 - (e) Did the limbs become stiff or remain loose?
 - (f) Did any movements of the body occur? If so describe them and their duration.
 - (g) Was the tongue bitten or was the saliva coloured with blood?
 - (h) Was there incontinence of urine or faeces?
 - (i) Pulse.
 - (j) Condition after attack, e.g. headache, vomiting, confusion, sleep, peculiar or automatic behaviour, crying or other emotional disturbances.
5. Further observations and opinion regarding nature of attack (continue on separate page if necessary).
6. Date of first fit.
7. How often do the fits occur?
8. Are all fits the same? If not describe different types.
9. What medicine is being taken?
10. Does the medicine help?
11. Name of witness on whose observations this account is based.

Date..... *Signed*.....

A SHORT ACCOUNT OF THE PRE-PARACHUTING SELECTION COURSE AT AIRBORNE FORCES DEPOT, WITH SPECIAL REFERENCE TO THE PART PLAYED BY THE DEPOT MEDICAL OFFICER¹

BY

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THE aim of the pre-parachuting selection course is to choose men who are likely to make good Airborne soldiers, the following qualities being considered necessary:

- | | |
|------------------------------------|--|
| (1) <i>As a Parachutist.</i> | (The ability to make a parachute |
| (a) Control over Anxiety. | descent without hesitation or injury.) |
| (b) Physical Fitness for Landing. | |
| (c) Agility. | |
| (2) <i>As an Airborne Soldier.</i> | (Particular qualities are necessary in |
| (a) Good Physical Function. | view of the exceptional conditions of |
| (b) Stamina and Determination. | all Airborne operations—viz. great |
| (c) Intelligence and Initiative. | physical and mental stress; often |
| (d) Control over Anxiety. | being surrounded and after being |
| (e) Team Spirit. | cut off from Leaders; under new |
| (f) Discipline. | unknown ground conditions, and |
| (g) Leadership. | experiencing the sudden change from |
| | complete peace to total war without |
| | acclimatization.) |

During the selection course these combined qualities are “artificially” tested by observing the men under conditions of mental and physical stress calculated to reveal weakness in their make-up.

Only volunteers are accepted, about 120 all ranks arriving each fortnight for selection. They form “P” Company and are divided into two platoons—

¹ Note by *Commander, Parachute Field Ambulance*, Lt.-Col. A. T. Marrable, D.S.O. Royal Army Medical Corps.

It is felt that this article will help to keep alive the knowledge of what is required of a volunteer before he can become a trained parachutist. Should an expansion of Airborne Forces ever become necessary, the facts set out in this paper will be of great help to all medical officers.

each with three squads of thirty men. Officers and senior N.C.O.s are distributed as equally as possible amongst the six squads. Each squad has a Serjeant (A.P.T.C.) Instructor (Airborne) who controls and instructs. Each Platoon has a Parachute Regiment Officer and Serjeant. The Company Commander has overall control of the whole course.

THE SELECTION TEAM

There is a Personnel Selection Officer, aided by a Serjeant R.A.M.C. Intelligence tester, and the Depot Medical Officer to complete the selection team. A conference is held at the end of each course—each man being reported on by the Platoon Officer and Serjeant, the P.S.O. and the Medical Officer. The Company Commander then decides from the evidence so presented whether to pass, fail, or recourse the man. Qualities needed are considered in relation to rank, there being three categories:

- I. All Commissioned Officers.
- II. N.C.O.s of substantive Corporal's rank and above.
- III. Men of L/Cpl.'s appointment and below.

THE COURSES

Although nominally of two weeks' duration, the course may be considered to last only seven working days, on account of administrative commitments. There is a three-day period of limbering up, documentation and introductory lectures. After a thirty-six-hour break there is a second period of four days, during which the more severe tests are performed.

The first period then, includes addresses by the Company Commander, the Unit R.A.F. Officer, and the Company Commander of the Recruiting Team—an experienced Airborne soldier. There are introductions to the R.A.F. by lectures and demonstrations, and graduated P.T. in the gym to initiate the men into the physical side of the course. There are a few film shows—including "The Way Ahead" and "Operation Varsity" to remind the men of the less romantic and more realistic aspects of soldiering. The initial gym work consists of the usual squad exercises, boxwork, minor team games, bayonet fencing and log and medicine ball exercises. Each man's agility, intelligence in action, physique and team spirit are noted by the P.T. Serjeant, and the Platoon Officer and Serjeant.

The second period is more comprehensive and introduces the men to the "Trainasium." Here the more specialized activities are performed—"group tasks." Assault Course work, rope climbing, the "Monkey-Rack," and a concluding run in full equipment.

Group tasks consist in two teams (of ten men) racing against each other whilst carrying, pushing and lifting a long log under, along and over obstacles. A similar task is to bridge a gap with two logs, roll three heavy oil drums over the bridge and finally retrieve the logs. These activities bring out leader-

ship, team spirit, determination, and occasionally (?) intelligence, whilst producing conditions of near exhaustion and boredom when the tasks are repeated several times.

Assault course work brings out determination and stamina, physical fitness and agility.

TESTS

Each man is further tested on the "monkey-rack"—a large tubular steel framework, rising to about thirty feet, which is climbed in a variety of ways, and used for exercises about twenty feet above the ground. This tests confidence, physical and mental, in working at heights. Rope climbing and a scrambling net afford further evidence of agility and aerial confidence. Road runs in full equipment bring out qualities of determination, team spirit and discipline.

Every man is interviewed for about five to ten minutes by the Personnel Selection Officer (an experienced parachutist and ex-member of a War Office Selection Board). An impression of the man's character is gained in this way, and attempts are made to discover such things as intelligence, interests, past occupations, family ties, and general mental make-up. A personal particulars book is filled in by each man, in this he writes down an account of his school and family life, his hobbies, jobs, sports and attainments. Leading questions are asked about his medical history, so worded that any neurotic preoccupation with health is revealed (this is carefully noted as there is frequently great anxiety about parachuting in such neurotic types). His reasons for volunteering for parachuting are given—being tired of his unit, or wanting to return home from abroad, are unsatisfactory reasons and often reveal a poor type of character.

The Serjeant R.A.M.C. Intelligence tester supervises the testing of each man's innate intelligence, and SG of 3 minus being the usual lowest permissible for entry, though recently the standard has been apparently lowered to SG 4.

One of the main functions of these interviews and tests is to pick out the neurotic nervous type of man who is a potential parachuting "refusal." Intelligence and past disciplinary record are the other important aspects reported upon by the P.S.O.'s department.

Throughout the course, turnout, bearing, cleanliness, standard of barrack room tidiness and kit layout are noted, a good subjective and objective discipline is considered very important.

MEDICAL OFFICER'S DUTIES

The Depot *Medical Officer* makes the following contact with each course:

- (a) All ranks are seen for routine medical inspection.
- (b) 10-30 per cent of all ranks are seen when reporting sick.
- (c) Officers are seen in the Mess.
- (d) Indirectly when all ranks are discussed at the conference.

The medical officer does not have time to see the squads performing in the gym or elsewhere, but as there are at least already three reliable types watching the squads, this does not seem to be much of a drawback.

The functions of the medical officer would appear to include the following points:

(i) Deciding that each man is up to the required standard of *physique*, and that he is not suffering from any illness calculated to render him unsuitable for Airborne Forces.

(ii) Trying to form an opinion upon the parachuting fitness of each man—judging from the height, weight, development, past record of dislocations, fractures and sprains, etc. Occasionally an impression of the mental parachuting fitness may be gained from evidence of neurosis, hysteria, faints, etc.

(iii) Assessing the man's *stability of health* from enquiry into the past history of ill-health and time lost therefrom at school and at work. It is exceptional for any man to reveal recurrent ill-health during only two weeks, and evidence can only be obtained from questioning—oral and written, and occasionally from perusal of the Medical History Sheet.

(iv) Picking out *malingers*. This can be done fairly accurately with a little experience. Such types are a big liability in any unit and are considered particularly undesirable in an Airborne Unit.

(v) Occasionally, reporting on a man's *determination* to overcome minor injury sustained on the course. Serious injury is excluded clinically and if necessary radiologically, and as long as the man is not obviously suffering considerably he is returned to duty with protective strapping or dressing. Confirmation of the medical officer's impressions must be gained from those controlling the man's squad who see the injury and subsequent performance.

(vi) Reporting of a man's *intelligence* may occasionally be permissible when particular incidents are witnessed at examination or on sick parade.

(vii) *Reviewing the impressions* gained against the more experienced opinion of the other members of the selection team at the final conference. It is considered most undesirable that a good man should be hastily condemned on some minor medical abnormality.

MEDICAL EXAMINATIONS

Routine examination commences with complete stripping of the man prior to weighing and measuring and testing the visual acuity. The build, deportment and development are noted, and the presence of any skin condition or skeletal deformity sought. The feet, ankles, and knees, hips, spine and arms are systematically examined during full active movement—stationary and then during jumping, bending, “pressing up,” toe touching, and other exercises. The sense of balance is tested by standing on tip-toe with eyes closed. Following exercise the heart is auscultated and the chest examined. Inevitably the latter examination is brief, but enough to render noticeable any disease likely to cause the man to suffer during the course. Any minor, possibly serious, con-

ditions are brought out during the course's physical exertions, and the man is sent sick on the slightest suspicion of ill-health. The hernial sites and genitalia are examined and varicose veins tested for severity if present. The auroscope is used only if the man gives a history of ear trouble, shows evidence of same, or is noticeably deaf. The men are questioned in a soft voice at a range of about 6 feet, and any deafness can be definitely noticed. Routine preliminary questioning covers fractures, illnesses, earache or discharge, fits, faints, black-outs, hospitalization, and time lost through ill-health. Should this examination seem inadequate, it must be pointed out that:

- (a) Twenty men have to be seen in sixty minutes.
- (b) The men are under perpetual observation during the course and any ill-health is quickly noted.
- (c) All ranks are given a medical examination before leaving their parent unit to start the course.
- (d) Any doubtful cases are given full examination and if necessary specialist attention at the near-by military hospital.
- (e) Men wishing to conceal any ill-health are almost certainly good keen types who are genuinely anxious to serve in Airborne Forces, they may well make better soldiers than less enthusiastic but physically perfect men.

STANDARDS

In discussing the medical grading of potential parachutists it must be realized that official standards must very often be ignored in the interest of all concerned.

The necessary official PULHEEMS¹ standard is: P2 U1 L1 H1 E3 E3 M2 S2 with C.P. 2 and height less than 73 inches and weight less than 182 lb. It was pointed out some two years ago by Captain A. H. Cameron, R.A.M.C. (then M.O. to Airborne Forces Depot), that if this standard was rigidly adhered to, some 60 per cent of all Airborne Forces personnel would have to be considered unsuitable. However, even though official standards are flouted to a certain extent, it is considered that the interests of Airborne Forces are safeguarded adequately by the system at present adopted.

The PULHEEMS system is meant above all things to be a functional method of assessing and listing physical and mental capacity. In general it is felt that any man who can pass the physical side of the pre-parachuting course is eligible to be elevated to the required Pulheems standard if he is not already of that standard, and, of course, after completing the actual course of parachute descents he must be considered suitable from the psychological aspect also. Therefore if official standards must be respected from the documentation point of view, it would be easy enough to alter any pulheems below the necessary

¹ Minimum medical standard now required for parachutists is:—

P	U	L	H	E	E	M	S	Vision	E	E	C.P. 3
2	2	2	2	3	3	2	2	3	3	or 1 6	

standard at the end of the completed course. In passing, one wonders why a P.E.S. of F.E. alone is not sufficient, as the difference between U.L. and H. gradings of 1 and 2 varies not so much with the man as with the medical officer examining him.

Physical Capacity (P).—This is tested fully during the course, by virtue of the lifting, climbing, running, pushing, pulling and other exercises.

The *Cardiovascular* system which stands up to the course must be considered functionally satisfactory. In general the *Respiratory* system must also be satisfactory, provided that there are no abnormal chest symptoms persisting throughout. The only real danger would appear to be an active tuberculous lesion, but the general symptoms from such a condition would draw attention to the man, and clinical and radiological tests would then be performed. One such case was discovered recently after *repeat* X-rays.

Dermatological conditions are rarely of such severity as to render the man unsuitable. If there is any doubt about the man by virtue of severe acne vulgaris, external otitis, epidermophytosis or other relatively common disease, a dermatologist's opinion of the prognosis and "P" grading is always obtained. The sweating and increased skin metabolism caused by the course are likely to accentuate any dermatological conditions liable to worsen with tropical service.

Few men over 30 years of age volunteer for the course. Those that do (that is N.C.O.s and O.R.s—not the officers) are usually keen and have taken a pride in their health. They may often have difficulty on the course, but their stamina usually carries them through. They are, of course, watched very carefully to ensure that they are "up to it" physically. This contrasts strongly with the attitude of officers particularly of Field rank and above who are not always made to carry out the full course. It is felt that such senior officers should be made to do the course to ensure that they are of the required physical standard. Otherwise their pulheems assessment cannot be a true functional one, and they may quite well be physically a liability to an Airborne Unit in Exercises or Operations.

From the point of view of build it is unreliable to judge a man on his size and muscular development. Frequently it is found that the slight wiry type of man is a much better performer than the well-developed muscular man.

Stamina is the great thing. A man who can keep going and urge his fellows on is a much more valuable fellow, whatever his size and shape, than the strong muscular man who falls out and is lacking in determination. Lack of determination is a common reason for refusing to accept a man for Airborne Forces. Height and weight standards are occasionally ignored if the man is a particularly good type and well proportioned.

The *Upper limbs (U)* and *Locomotion (L)* are fully tested by the course. Any man who can complete the course should be graded U.1 and L.1. As a general principle, deformities or old injuries are ignored, *provided* they have no effect on the function. Varicose veins are given full attention, and may

occasionally be a reason for finding a man unsuitable, although if they are treated satisfactorily the man may later be acceptable.

Hearing (H) is considered satisfactory if the man is able to hear all commands and carry out his duties without ever demanding a repetition of any command. During routine examination each man is purposely addressed in a very low voice and any deafness is noticed and naturally given full attention. It is rare for any man with deafness of any degree to reach the pre-parachuting course as the condition is noticed during the initial Army examinations and during training. Ear disease is a somewhat difficult subject. Provided that the man gives no history of ear trouble and his hearing is normal no further examination is given, except to exclude the presence of external otitis. If the man has had earache, otorrhœa or any such complaint, the auroscope is used. Healed perforations with good auditory function are considered satisfactory. Any doubtful condition is immediately referred to the E.N.T. specialist who is asked for his opinion regarding prognosis and P grading. Providing auditory function is good and P grading unaffected, the man is accepted, doubtful cases are *not*, unless the man is exceptionally valuable and future treatment holds a good chance of cure.

*Eyesight (EE)*¹ Officially this must be at least 3 3 i.e. no men with spectacles are considered suitable. This is complete disagreement with experience. Captain A. D. Roy, R.A.M.C. (then M.O. to Airborne Forces Depot), in 1949 questioned R.A.F. experts, parachuting veterans and others who persistently jump or jumped in spectacles. No case was revealed of any man hurting himself or his spectacles. Many men jumped into action with spectacles. The policy adopted is the following: Any man whose vision is worse than 3 3 is given spectacles to correct him to 3. 3. or better. Provided that he is able to perform reasonably well without spectacles (roughly 6. 6.) he is acceptable. He is issued with two pairs of spectacles and may please himself whether he jumps with them (strapped on with adhesive plaster of course) or not. It is found that most men prefer to jump without, and only those with astigmatism use spectacles, carrying their spare pair in the pocket. Only a small percentage of volunteers cause any difficulty as regards eyesight, and of course all aspects are considered before such men are accepted.

Mental Capacity (M).—This must be M 2. No man of M 3 or lower grading should be sent on the course.

Emotional Stability (S).—This must be S 2. No man of S 3 or lower should be sent on the course. During the course cases may arise which are referred to the psychiatrist with anxiety or other symptoms. Such cases may have to be downgraded.

¹ Minimum medical standard now required for parachutists is:—

P	U	L	H	E	E	M	S	Vision	E	E	or	E	E	C.P.
2	2	2	2	3	3	2	2	3 3	3 3	1 6		1 6	3	

Standards adopted, then, for potential parachutist soldiers are:

Pulheems:	P U L H E E M S	Height 6 ft. 1 in.
	2 1 1 1 6 6 2 2	Weight 182 lb.
	3 3	C.P. 2.

with occasional, deserving cases allowed to pass in spite of being strictly below standard.

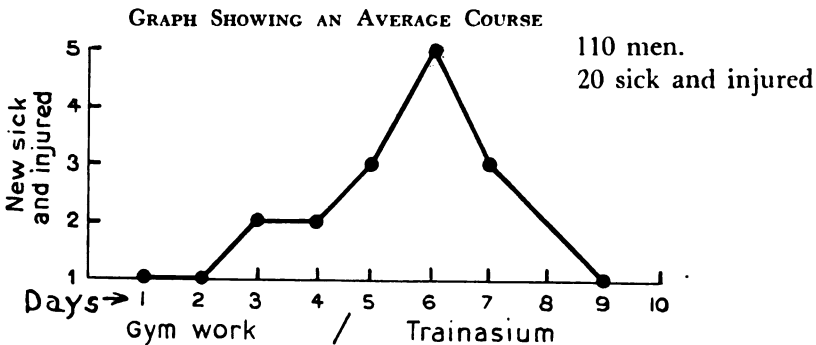
It is felt that the pre-parachuting course gives the opportunity of very accurate medical grading in view of the extensive testing of the physical, mental and emotional make-up of each man.

The provision of special containers for dentures during parachuting is considered unnecessary. The jaw is kept firmly closed by the strap of the helmet, and no cases of injury are reported from damage to dentures (as far as is known).

INCIDENCE OF INJURIES AND SICKNESS

Seven consecutive pre-parachute courses were analysed for the incidence of injuries and sickness. The initial strength of the seven courses totalled 766 all ranks. The number of new cases seen reporting sick to the medical officer was 147, an incidence of 19 per cent. This does not include men who injured themselves but who continued the course without reporting sick. Such cases are few as the P.T. instructors send men sick as soon as they show signs of having trouble.

The peak period for injuries is the second day of the week devoted to the second period of the course, i.e. when the men pass to the severe "trainasium" work. The percentage of injured per course varied from 11 to 30.



DISPOSAL OF SICK AND INJURED

Average number being roughly 20 per course.

11 will be given full duty or treatment allowing continuance of full duty (Group I).

7 will be given treatment and light duty for up to two days (i.e. two full working days) (Group II).

2 will be given treatment and light duty for more than two days or admitted to hospital (Group III).

About two-thirds of those reporting sick are injured on the course. One-third are medical conditions or extra course injuries.

Only 9 men out of the 7 courses analysed were admitted to hospital. Only 2 men sustained "serious" injuries—both chip fractures of the ankle. One case of pulmonary tuberculosis was discovered—this and two cases of otorrhea were the only serious medical conditions—the others being acute infections.

Only about one case per course was failed on the medical officer's advice. Two cases of hysteria, one physical "wreck" with a hernia, one case of deafness, and 2 cases of chronic otitis media being the reasons for this action. 2 other cases reported sick merely to request to be returned to their unit—this was arranged after the men had completed the course.

Of the injuries 10 or 11 per course occur on the trainasium (mainly Grade II) and 2 or 3 per course occur in the gymnasium (mainly Grade II).

ANALYSIS OF SITE OF INJURY: 147 SICK AND INJURED.

<i>Site</i>	<i>Grade I</i>	<i>Grade II</i>	<i>Grade III</i>	
Ankle	7	18	3	
Foot, heel, toes	6	4	1	
Pulled muscle, strained back	18	11	0	
Shoulder, elbow, wrist, fingers	10	5	0	
Knee, leg	14	10	1	
Other illness	20	4	15	(including "rtu" and hospital cases)

SITUATION OF OCCURRENCE OF INJURIES

<i>Situation</i>	<i>Grade I</i>	<i>Grade II</i>	<i>Grade III</i>
Gymnasium	11	5	0
Assault course	9	32	3
Trainasium	11	14	0
Extra course	1	3	0

It is not felt that the course should be made any easier. A certain number of injuries are inevitable, and fit men do not come to any real harm from being injured anyway.

Very few cases, as has been stated, are failed on medical grounds, the policy being to allow any man to try the course providing that he is not too ill to do so. From personal recollection the main causes for failure are: Bad discipline, bad stamina, voluntary withdrawal, bad past record, and lack of team spirit. The nervous potential refusals are listed and weeded out later on the actual parachuting course. About two-thirds of the original number of volunteers pass out as trained parachutists.

SUGGESTIONS

(1) Officers of all ranks should complete the course before being accepted for Airborne Forces.

(2) If possible, mass radiography should be instituted for all volunteers to be performed before commencing the physical side of the course.

(3) The standard of innate intelligence be raised once more to at least SG 3 minus.

(4) That M.O.s at the parent unit should make a more careful preliminary medical examination—several cases of ringworm, impetigo, etc., as well as physically unsuitable men have been sent on the course, and are a nuisance and a danger.

(5) Men who have “refused” injections in the past should be closely questioned about their reasons for doing so. Often men without adequate reasons for refusing are very poor types—either barrack room lawyers or easily led men. Questioning thus may give additional help in weeding out undesirables.

SUMMARY

(1) The qualities considered necessary for an Airborne Soldier are described.

(2) A short description of the pre-parachuting course is given.

(3) The part played by the Depot Medical Officer is described.

(4) The present method of medical examination and assessing volunteers is described.

(5) The rationale for this is discussed.

(6) A description of the injuries and sickness occurring on the course is given.

(7) Suggestions are made for rendering the present position more satisfactory.

I wish to thank Colonel K. T. Darling, *D.S.O.*, *O.B.E.*, Commandant, Airborne Forces Depot, for permission to publish this report, and Lieut.-Colonel A. T. Marrable, *D.S.O.*, *R.A.M.C.*, Senior Medical Officer, 16th Independent Parachute Brigade Group for helpful criticism.

AN IMPROVED WASSERMANN TECHNIQUE

The Value of a Dilute Antigen Suspension Assessed in a Series of 14,952 Tests

BY

H. M. RICE, M.D.Lond.

*Director, Department of Pathology, Nottingham General Hospital
Late Major R.A.M.C., Army Serologist*

THE detection and interpretation of the "Doubtful" Wassermann reaction remains a major problem to all serologists performing the test. Efforts are continually being made to increase the sensitivity while retaining the specificity of serological tests, and many serologists employ modifications of their own in performing the W.R., although practically all methods used in this country are based on Wyler's (1929) modification of the Medical Research Council Method Number 1.

In that method a constant and relatively large quantity of antigen is employed, regardless of the varying amounts of antibody in individual sera. Although the Wassermann antigen is not a true antigen in the immunological sense of the word its reaction with syphilitic antibody obeys the general laws of antigen-antibody reactions, including that of optimal proportions. When, therefore, the amount of antibody in a given serum is very small the reaction with the relatively large quantity of antigen may be in the zone of gross antigen excess, when no detectable result will be seen. Further, it is known that complement fixation occurs maximally in the zone of moderate antibody excess. Therefore, if gross antigen excess is present, not only will the antigen-antibody reaction be minimal, but complement fixation will also be greatly diminished.

Many serologists have, in the past, proposed technical modifications to embody consideration of these facts. Reference to various workers and their methods was made by Richardson (1940) in introducing his own technique. His paper contained full consideration of the theoretical issues involved, which are therefore omitted from this communication.

Richardson pointed out that it was Sordelli, in 1931, who first introduced the method of using diluted antigen suspensions to increase the sensitivity of the Wassermann reaction. His own method was claimed to combine the advantages of the Wyler and Sordelli techniques, but was too laborious for routine diagnostic use, and so has not been generally adopted in spite of its advantages of increased sensitivity without diminished specificity.

After reading Richardson's paper, J. W. Lacey, in 1945, introduced a

technical modification of M.R.C. No. 1 method at the District Laboratory, Woolwich, then the main serological laboratory of the Army. He added a fourth row to the test, employing a unit volume of dilute antigen with 3 M.H.D. complement. Thus small amounts of antibody can react with a small amount of antigen, and the reaction is much more likely to be in or near the equivalence zone than when only the standard amount of antigen is used. When a large amount of antibody is present, in a strongly positive serum, the reaction with the dilute antigen will be in the zone of moderate antibody excess, when complement fixation is optimal.

In practice Lacey's method has proved of great value, and agrees completely with the theoretical considerations outlined. The question of non-specific reactions is referred to later.

In 1946 the writer took over the laboratory from Lacey, and adopted his technique. The results, in a laboratory averaging 2,000 tests a month, have been so consistently good that the method has been adopted as the standard Army technique. So many visitors have enquired into the use and value of the fourth tube that this article has been written in order to publicize a valuable technical modification.

TECHNICAL METHOD

Four-row copper racks are used, and M.R.C. No. 1 method (Wyler) is followed for the front three rows of each test. The fourth (back) row repeats the 3 M.H.D. row exactly, with the exception of the antigen, which in this case is one volume (0.11 c.c.) of a 1/100 as against 1/15 suspension.

Donald's droppers are used throughout the test. When dropping the 1/100 antigen Richardson used the 0.76 cm. dropper. In Lacey's technique the 0.9 cm. dropper is used, and the antigen strength is in fact, 1/90, being a sixfold dilution of the 1/15 suspension remaining when that preparation has been dropped. 1.5 c.c. are allowed for each row of tubes, our test-numbers always being sufficient to provide the necessary few c.c. excess for completely filling the dropper.

Our only other technical variation is the employment of a thirty minute incubation period (with a further shaking after ten minutes) after the sensitized cell suspension has been added. This is in accordance with modern custom: and, with large numbers, a period as short as three to five minutes (Richardson and Wyler) is quite impracticable. The longer incubation period diminishes the number of non-specific doubtful readings encountered by workers using a short period of incubation: and their claims for sensitivity are more than balanced by the fourth row. Wyler (1932) attributed his decrease in non-specific doubtful reactions mainly to the increased time (thirty minutes) allowed for hæmolysis.

ANALYSIS OF THE RESULTS OF 14,952 TESTS

During the years 1947 and 1948 a total of nearly 50,000 Wassermanns was performed. From this number 14,952 tests have been singled out for analysis,

as all these specimens were received from hospitals in or near London, and show, in consequence, a very low contamination rate and a large number of serial examinations on individual cases.

All types of disease are included: early, fully developed and late primary syphilis, both treated and untreated: secondary, tertiary, congenital, latent and relapsing syphilis: and many cases for investigation, on which a diagnosis of syphilis was never made. Complete series of serological results, first negative, then doubtful, positive, doubtful and finally negative, are shown in 18 cases of treated syphilis. The "run-down" of the Army, with many patients disappearing on demobilization, prevented a larger number of complete serial results.

The value of the four-tube technique lies in its demonstration and clarification of doubtful results. Further analysis is therefore limited to their consideration.

METHOD OF READING

The writer was brought up to and has retained the method of reading which expresses the hæmolysis occurring in individual tubes by figures from 0 to 8, the former representing no hæmolysis and the later complete lysis of the indicator. Estimations are made in quarter parts, so that the only readings employed are 0, 2, 4, 6, 8. (Occasionally a reading of 7 in the 3 M.H.D. row is recorded, if the fourth row shows a greater hold-up.)

The criterion for a positive result is the complete inhibition of hæmolysis in the 3 M.H.D. row with the full dose of antigen (second row). The back row reading shows a hold-up equal to or greater than that seen in the second row. Exceptions are very rare, and are considered later.

No positive serum has been encountered which showed hæmolysis in the back row with inhibition in the second and third row. This accords with Harrison's (1918) criteria for a good antigen extract which should show complete fixation of 3 M.H.D. in dilutions up to 1/200.

Reading the back row first, then the second row and then the third (5 M.H.D.) row the usual values seen in the test are:

<i>Positive readings:</i>	000, 002, 004, 006, 008.
<i>Doubtful readings: (a)</i>	026, 028, 048, 068.
<i>(b)</i>	078, 088, 288, 488, 688.

Doubtful readings are divided into groups (a) and (b) because the former would be interpreted as doubtful in the ordinary M.R.C. No. 1 test, while the (b) group would be interpreted as negative in the 3-tube test, and are only shown to be doubtful by the reaction in the fourth tube.

The distribution in 14,952 tests, has been:

Negative	13,263
Positive	1,211
Doubtful (a)	207
" (b)	117
Septic or anticomplementary sera	23
Atypical results	131

All Wassermanns have been performed in parallel with the standard Kahn test and the correlation of the doubtful groups with the Kahn test has been:

	<i>KAHN</i>		
	<i>Positive</i>	<i>Doubtful</i>	<i>Negative</i>
Doubtful (a)	77	87	43
Doubtful (b)	49	61	7

In those few untreated cases which showed disagreement between the Kahn and Wassermann results (i.e. W.R. + Kahn – or vice versa), no report was made until the tests had been repeated on a fresh sample of serum.

ATYPICAL POSITIVE AND DOUBTFUL READINGS

During the two-year period 131 reactions occurred in which the fourth tube showed hæmolysis when the second (3 M.H.D.) row tube showed less or no hæmolysis. It is probable that at any rate some of these atypical reactions were due to the presence, in the antigen, of non-specific haptens. In full-strength (1 in 15) antigen, these may be sufficient to fix 3 M.H.D. of complement: but in the sixfold antigen dilution they are insufficient to cause complete fixation, so that partial or complete hæmolysis occurs. Twelve such reactions occurred with one batch of antigen which was immediately discarded: and the repeat tests were negative.

Another factor must be considered. In military laboratories personnel are subject to sudden postings, so that it is always necessary to have at least two persons capable of performing the test. These are generally the officer-in-charge and the Senior N.C.O. It was noticeable that atypical results were more liable to occur shortly after a Senior N.C.O. had been posted away and while his successor was gaining experience. This was inevitable, and called for the repetition of a number of tests. It is most unlikely that civil laboratories, where technicians are on a permanent basis, will ever suffer in the same way as the Army laboratories during the period of the run-down after the war.

SEPTIC SERA

Apart from the causes considered, infected sera often give atypical positive or doubtful reactions. Such sera are reported as "Septic," and experience shows that close inspection (performed as a routine on all sera examined) of sera giving atypical results often justifies their rejection on grounds of infection. Many such septic sera were seen in the 35,000 tests performed during 1947 and 1948 and not considered in this paper. These sera, coming by post from outstations and from overseas, contained a far higher proportion of positives, as many had first passed through a local Kahn screen. In the 14,952 tests now considered only 16 sera were labelled "Septic" and a further 7 "Anticomplementary."

DISCUSSION

The value of the fourth tube is shown in that group of results labelled doubtful (b). In these 117 results the Wassermann reaction as performed by

the M.R.C. No. 1 method would have been reported as negative. By employing Lacey's technique a report of "doubtful" can be given, which is especially valuable in cases for investigation, when a negative result would probably mean a delay of a month before a repeat examination would be made. A "doubtful" report on such a case is an indication to the clinician to repeat the test, when any increase in the strength of the reaction will be demonstrated. In 7 of our cases the doubtful Wassermann (fourth tube only) showed in the presence of a negative Kahn reaction, thus being the sole factor leading to earlier diagnosis and treatment of the cases concerned.

Although the results of only 14,592 tests have been considered in this paper, all tests in our laboratory have borne out the value of the fourth tube. The extra work involved is negligible, chiefly amounting to extra labour in washing tubes.

SUMMARY AND CONCLUSION

The use of a fourth row in the Wassermann test, employing 3 M.H.D. complement and 1/100 antigen, is a simple and reliable method of increasing the sensitivity while retaining the specificity of the reaction.

A series of 14,952 tests is analysed. In 117 tests the fourth tube enabled a report of doubtful to be given on a test which would otherwise have been reported as negative. In 7 cases this doubtful reaction was associated with a negative Kahn result.

The extra time and trouble involved are minimal, and the method has been adopted as the standard technique for Army laboratories.

The writer wishes to express his gratitude to Dr. J. W. Lacey, for permission to publish this account of his technique: to the various technicians who have assisted in the performance of the tests: and to the Director-General of the Army Medical Services for permission to publish this paper.

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THE NATIONAL TUBERCULIN SURVEY AND THE ARMY

BY

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THIS work was undertaken as part of a National tuberculin survey under the direction of the Medical Research Council.

It was considered that the male age-group 18 to 21 could best be supplied from the Army and the necessary authority was obtained for 5,000 men in Southern Command to be tested.

ORGANIZATION

As Assistant Director of Pathology the author was instructed to arrange for the tests to be carried out on the personnel of suitable basic training units. It is in these units that the National Service man undergoes his first military training.

There were certain difficulties to be surmounted:

- (1) To fit the procedure into an already full medical, selection and training programme.
- (2) To ensure as far as possible that there were no variations in the technique in different units.
- (3) To organize a supply of dry sterile syringes and needles.
- (4) To correlate the results with mass miniature radiography findings and arrange for them to be recorded accurately.
- (5) To complete the survey in under six months.

Six units were selected, each having a fortnightly intake of some 60 to 100 men. In the case of one unit this number was increased for the last three months of the survey to over 250.

A conference of the medical officers concerned was held, the technique and procedures to be adopted demonstrated and ways and means of fitting the tests into the medical programme discussed. Commanding Officers of units were then approached and the rationale and purpose of the test described. The latter were most co-operative and no difficulties were experienced in arranging alteration to the twelve week training programme.

Doctor A. E. Brown who was the medical officer responsible for the practical co-ordination of the nation-wide survey for the Medical Research Council kindly supplied details of the technique to be carried out. It had been decided that

a patch test would be unsuitable for active soldiers and the Mantoux test was selected. This consisted of a first test using a dilution of 1/10,000 Old Tuberculin followed by a second test in negative reactions using 1/100 Old Tuberculin (Wilson and Miles, 1946).

The technique advised was the intradermal injection of 0.1 ml. of material into the skin of the forearm at the junction of the middle and upper two-thirds. Medical officers were instructed to insert the needle, as nearly parallel with the skin as possible, to a depth of $\frac{1}{8}$ of an inch and produce a wheal 7 mm. in diameter.

The criterion of a positive reaction was the appearance within forty-eight hours of an area of palpable infiltration 5 mm. or more in diameter. Erythema alone was not considered significant.

A second test was performed on all negative reactions using the dilution of 1/100.

The actual diameter found was measured with a punched card before recording.

Visits were paid to units by Dr. Brown and the author, both to check errors in technique and to try to achieve some measure of agreement in the readings of positive, negative and doubtful results.

All the materials used were provided by the Medical Research Council. The tuberculin was received ready diluted in small rubber-capped bottles.

All glass syringes were used and these, together with needles were sterilized by dry heat at the Southern Command Laboratory. The syringes were put up separately in test tubes according to the principles laid down by the M.R.C. (M.R.C., 1945).

The needles were sterilized in tins in batches of fifty.

Both test tubes and tins were painted green and red in order that during the survey the materials used for weak and strong tuberculin could be kept separate. Sufficient syringes were supplied to ensure that they need only be used once before re-sterilization.

In all 5,130 complete tests were done, there being some loss due to cross posting and illness.

The test, like all inoculations in the Army, was on a voluntary basis.

In general it was stated that the men co-operated well and only two refusals were reported, both from the R.A.M.C.

All National Service Men undergo mass miniature radiography and the results could therefore be correlated with the tuberculin test.

There were four possible findings by the radiologist concerned:

- (1) Pulmonary Tuberculosis. Confirmed at chest clinic by large plate X-ray.
- (2) Possibly Tb. No action required. This heading covered such reports as "healed calcified glands."
- (3) *Abnormal* but *not* Tb. (Congenital changes, etc.).
- (4) Normal.

Completion of the M.R.C. Record Card was an essential part of the survey. Fig. 1 will show that a busy medical officer would have been put to much difficulty in finding the time to fill it all in. Apart from this there was the problem of having men waiting about whilst their particulars were entered with consequent dislocation of the training programme.

DATE Y / MONTH / YEAR	MASS-RADIOGRAPHY NUMBER	X	AREA CODE NUMBER									
Surname (Block Letters)		PRESENT HOME ADDRESS										
First Name(s)		Address										
Date (last day)	OCCUPATION	OCCUPATION CODE NO.	OCCUPATION OF PARENT OR GUARDIAN OCCUPATION CODE NO.									
PARTICULARS OF FACTORY, SCHOOL, OR OTHER ESTABLISHMENT		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%;">TUBERCULIN TEST</th> <th style="width: 30%;">Indicate RESULT by ringing +, — or ?</th> <th style="width: 40%;">Diameter of infiltration (not erythema) in mms. (Intra-dermal tests only)</th> </tr> <tr> <td style="vertical-align: top;"> 1st TEST </td> <td style="vertical-align: top;"> 0 + 1 — 2 ? </td> <td style="vertical-align: top;"> mms </td> </tr> <tr> <td style="vertical-align: top;"> 2nd TEST </td> <td style="vertical-align: top;"> 0 + 1 — 2 ? </td> <td style="vertical-align: top;"> mms </td> </tr> </table>		TUBERCULIN TEST	Indicate RESULT by ringing +, — or ?	Diameter of infiltration (not erythema) in mms. (Intra-dermal tests only)	1st TEST	0 + 1 — 2 ?mms	2nd TEST	0 + 1 — 2 ?mms
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1st TEST	0 + 1 — 2 ?mms										
2nd TEST	0 + 1 — 2 ?mms										
Indicate UNIT'S X-ray findings and disposal of patient by "X" in appropriate column (or clinic address in case of column "0")		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; text-align: center;">0 Possibly or initially T.B. referred to test Clinic at :—(Give address of Clinic)</td> <td style="width: 25%; text-align: center;">1 Possibly T.B. No action required</td> <td style="width: 25%; text-align: center;">2 Abnormal Definitely not T.B.</td> <td style="width: 25%; text-align: center;">3 Normal</td> </tr> </table>		0 Possibly or initially T.B. referred to test Clinic at :—(Give address of Clinic)	1 Possibly T.B. No action required	2 Abnormal Definitely not T.B.	3 Normal					
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FIG. 1.

The M.R.C. kindly consented therefore to the employment of a civilian clerk whose duty was to accompany the M.M.R. Unit to the camp and complete a card for each man whilst he was being X-rayed.

The cards were then handed to the medical officer who completed them as soon as the results of Mantoux test and M.M.R. were available. The coding of occupations was carried out by the clerk when the cards were returned to Southern Command Laboratory.

All medical officers had a supply of cards in case the M.M.R. Unit broke down and the men tuberculin tested before X-ray. This in fact happened on several occasions but no difficulties were experienced.

It was hoped that one medical officer in each unit would be responsible for

both injecting and reading during the whole survey. "Exigencies of the Service" prevented this, however, but not to an appreciable extent.

At the end of the survey medical officers were asked the following questions:

(1) How many medical officers were concerned in injecting and/or reading the tests?

(2) Did the medical officer consider the man to be a fair cross section of the male community of that age-group?

(3) How many refusals were encountered?

(4) Were any severe reactions noted?

The replies are given in Table I together with figures showing the numbers of tests completed and the *approximate* numbers of men who were available. Losses were due mainly to cross posting and sickness, some of these occurring before the cards were completed and some between the day of radiography and the day of test.

TABLE I

<i>Unit</i>	<i>M.O.s concerned</i>	<i>Type of men</i>	<i>Severe reactions</i>	<i>Refusals</i>	<i>Number of tests completed</i>	<i>Approx. numbers available in the groups tested</i>	<i>Percentage loss by posting, sickness, etc.</i>
L.I.B.T.B. Bordon	1	Good cross section	Occasional	Nil	407	470	13%
Green Jackets T.B., Winchester	One injecting, three reading. No change in staff	Good cross section	Nil	Nil	266	350	21%
4 T.R.R.E., Aldershot	1	Good cross section	A few local at 1/100 following a ? at 1/10,000	Nil	690	800	13%
3 T.R.R.E., Cove	One injecting, reading, except for 100 men	"Selected". Some potential officers	Nil	Nil	662	770	14%
9 T.R.R.E., Cove	One M.O. did 95%. One did 5%	Good cross section	Nil	Nil	1,113	1,260	11%
Depot R.A.M.C. Crookham	Two injected and one read. One M.O. changed in survey	Good cross section	4% severe local at 1/10,000	2	1,992	2,120	6%

No severe general reactions were reported, those described as "severe local" were characterized by a wide zone of erythema and œdema. In one case seen by the author, the skin showed a 3-inch area of erythema with a central 1-inch

Unit	Positive test 1st	Positive test 2nd	Negative test	? test	Total tests	Posted or partly tested	Refused	Grand total	Normal X-ray	Abnormal X-ray pos. test. Not T.B.	Abnormal X-ray neg. test. Not T.B.	Positive test. T.B. on X-ray	Negative test. T.B. on X-ray	Positive test. T.B. but no action	Negative test. T.B. but no action	Total X-rayed	Discrepancy due to
L.I.T.P., Bordon Camp	132	104	156	15	407	31		438	413	1	1			2		416	Of the 31 posted 22 had no X-ray
Green Jackets Trg. Bde., Winchester	83	70	112	1	266			266	262	1 1	2					266	
4 T. Regt. R.E.s Aldershot	286	152	252		690			690	687	1				2		690	
3 T. Regt. R.E.s Cove	311	140	211		662			662	653	3 1	1	1		3		662	
9 T. Regt. R.E.s Cove	475	234	381	23	1,113	22		1,135	1,119	1	2			1		1,124	+10 posted no X-ray + 1 also no X-ray but tested
R.A.M.C. Depot Crookham	1,007	421	539	25	1,992	12	2	2,006	1,951	30 5		4		4		2,005	+1 refused X-ray and Mantoux
Total	2,294	1,121	1,651	64	5,130	65	2	5,197	5,085	36 8	16	4 1		10	3	5,163	=34 not X-rayed
NOTE.— 3 — = 3 positive at 1/10,000 (1st test). 4 — = 4 positive at 1/100 (2nd test). 1 2																	

dark necrotic patch. This case occurred with the 1/100 dilution and had been marked doubtful at 1/10,000. There was slight malaise, and resolution occurred without ulceration. A few similar cases were reported and it is possible that in doubtful reactions at 1/10,000 it would be more satisfactory to give the next test with a 1/1,000 rather than a 1/100 dilution.

Assessment of the results showed that 5,130 men were tested out of 5,197 who actually had cards filled in. The approximate numbers available in the intakes were 5,770 giving a loss of 11 per cent from cross posting and sickness.

It is not proposed to report in detail on the results as an analysis will no doubt form part of the official Medical Research Council report. A preliminary survey of the figures is, however, of interest.

HEALTH CONGRESS THE ROYAL SANITARY INSTITUTE'S MEETING AT EASTBOURNE

BY

Colonel A. E. CAMPBELL, M.D.

Late Royal Army Medical Corps

Professor of Army Health

THERE are times in the year when medical matters hit the headlines in the daily papers. One of these is in April when the Royal Sanitary Institute holds its Annual Health Congress at a seaside resort and encourages the expression of opinion on subjects as varied as epidemiology, health legislation, the care of the aged and district heating.

The variety of interest is organized into sections by subjects and conferences by professional calling. There are for instance sections of Preventive Medicine, Engineering and Architecture, Maternal and Child Health, Veterinary Hygiene, Food and Nutrition, Housing and Town Planning, Tropical Hygiene and Hygiene in Industry, while in the conferences there are met together Medical Officers of Health, Engineers and Surveyors, Sanitary Inspectors and Health Visitors.

Those who speak are as varied as those who attend. Men and women known in medical science, engineering, agriculture, etc., others prominent in local and national administration and in the Colonial Service.

The list of delegates reads like a guide to the Local Authorities of the country. Aldermen and councillors, chairmen and members of health committees, medical officers of health and sanitary inspectors, engineers and surveyors and veterinary surgeons, health visitors and welfare workers.

There is variety too in the countries and organizations represented and this year was exceptionally strong in overseas representation. Commonwealth countries and Colonies, Belgium, Denmark, France, Germany (British Zone and Berlin), Italy, Netherlands and the U.S.A. sent delegates.

Associations of Social Workers and of Teachers, Regional Hospital Boards and Executive Councils of the National Health Service, Institutions of Engineers, Queen's Institute of District Nursing, Royal Colleges and Teaching Schools of Public Health, the Trades Union Congress and Universities were included in the "authorities" represented.

To a Service representative the preliminaries to attendance are not unfamiliar—introductory literature, and requests for personal particulars, "Joining Instructions" do not, however, include restrictive warnings that dogs/batmen must not be brought. Accommodation is a matter for individual

arrangement with, of course, the help of local officials to whom visitors are a main concern.

Printed copies of papers for discussion are made available beforehand and Presidential Addresses on the day on which they are given. There is therefore opportunity for selection based on special interest, personalities or the likelihood of discussion.

The first day is given to inaugural and business meetings. The President is installed by the Chairman of the Institute's Council, welcomed by the Mayor and gives his Inaugural Address. The following days are filled by meetings of Sections and Conferences, excursions to local hospital installations, factories, and places of public health or historic importance. Three evenings are given up to Mayoral reception and the Congress Dinner.

This year's President was Earl de la Warr, who referred in his address to the £450 million expenditure on the National Health Service for curative purposes as compared with £9 subsidy for new permanent houses and £6 for the school health service on the preventive side. As a farmer, the Earl had something to say also on the cleaning up of dairy herds and milk supplies and the improvement of rural water supplies.

There was a large attendance to hear Professor Mackintosh of the London School of Hygiene give his Presidential Address in the Section of Preventive Medicine. He opened by stating that a National Health Service can hope to remove the harmonies which threaten the life of the community by: (a) The promotion of health; (b) the prevention of disease; (c) medical care, and (d) after-care and restoration to health.

It was his view that medical care continued to hold chief place in the minds of the public and the profession. There was no broad conception of a National Health policy and the tendency was to develop a "sickness" service for the nation. The development of a national medical service was one of the most urgent needs of the time but it was wrong to use the word "health" in this connexion.

"Another disquieting development in recent years is the increasing predominance of the narrow clinical point of view." There was a danger that social medicine, practised by M.O.s.H. and health visitors for years, might lose its integrity. On the other hand many of the younger clinicians have accepted the challenge of ultimate causes of disease and have begun to study whole communities. It is necessary for the M.O.H. to meet the demands of modern conditions and to study the prospect for the welfare of the community through preventive medicine. The field of epidemiology was opening up with new techniques to cover the whole range of diseases and not merely to cover infectious diseases. Here lay future work for the M.O.H. and a Health Department freed from responsibility for hospital and clinic services. In speaking of health in industry Professor Mackintosh said: "The vast majority of problems of health and sickness in industry, however, are not the obscure hazards but the simple everyday matters that require supervision

on the preventive side by the health services, and on the other side of medical care by the family doctor." Teaching and practical instruction must be directed towards improvement of the public health service so that it may adapt itself to new demands.

Following Professor Mackintosh two papers were presented on Field Epidemiology. The first by Dr. Reid, of the Department of Epidemiology and Vital Statistics, London School of Hygiene, dealt with technical aspects. Epidemiology is the study of the whole people, not just the following of pathogens. Increased tempo in modern life, new psychological stresses are added to the effect of environment on an ageing population. Even in the study of infectious diseases, bacteriology is not all. Laboratory and field investigations are complementary, not exclusive. Special skills were necessary for the epidemiologist studying the sick community rather than the sick individual. A working knowledge of arithmetical measures was not difficult to acquire. The assessment of technical significance and the technique of sample survey were developments of great potential importance.

Dr. Gibson (County Medical Officer, Leicestershire County Council) dealt with the practical aspects of Field epidemiology as affecting the Health Department. He said that the first essential was to get rid of the idea that investigations of spectacular epidemics formed the main point of the work. Routine investigations of isolated cases and small outbreaks may check an outbreak, prevent the occurrence of future outbreaks and develop the organization for dealing with the large-scale epidemics. Much information was to be gained from the study of outbreaks in nurseries, schools, homes, etc. Accurate knowledge of incidence is essential but often difficult to obtain.

Dr. Gibson did not pretend that Field work would be easy. It would be necessary to keep practical possibilities to the fore and to co-operate with all branches of the medical profession and with university departments.

The health visitors also met in conference on the first day under the Presidency of Dr. Alan Moncrieff, Nuffield Professor of Child Health in the University of London.

The first of the supporting papers was on Family Welfare by Mrs. Pawson, a member of the Royal Commission on Population, who discussed the subject from that point of view.

The second was by Dr. A. T. M. Wilson of the Tavistock Institute of Human Relations. Those who remember Dr. Wilson in another place during the late war would not have been disappointed in his discussion of "The Interaction of Psychological and Social Factors in Family Life." He referred to some interesting results of recent surveys of social relationship and finished by putting what seemed to be a very comprehensive question: "What social services, working by what methods, to what extent and at what points in the history of the family, are needed to reverse the present trend towards 'social atomization' and to offer some opportunity of restoring the social effectiveness of community life and with it the effectiveness of the family as our basic

social unit." At the same time that those concerned with preventive medicine and the health visitors were conferring on their own subjects, those interested in veterinary hygiene were considering, just as critically, the scientific approach to meat inspection and also legislation on the provision of a safe milk supply.

The Mayoral Reception in the evening allowed a number of the delegates and visitors to indulge in what some of them had heard referred to earlier in the day as "passive distraction," extending even as far as "effective participant relaxation" in the case of those who were encouraged to take part in the cabaret "floor show."

On the second full day, sections on Food and Nutrition and Hygiene in Industry met and conferences for M.O.s.H. and Engineers and Surveyors were held.

The papers presented to the Food and Nutrition Section dealt with hygiene in the Baking, Canning and Meat Products Industries and were most useful summaries written from the non-medical angle.

The sectional meeting on Hygiene in Industry was presided over by Dr. Donald Stewart. The first paper was read by Dr. J. M. Regan of the Medical Research Council Staff and dealt with the researches in Occupational Psychology, Physiology, Toxicology and Medicine being carried on by the Council's Research Units. Much of this work was covered at the Conference held by the Council in March for Service and Industrial Medical Officers which was reported on in this Journal (July 1950) and needs no further reference. The second paper was read by Dr. C. N. D. Cruickshank of the M.R.C. Industrial Medicine Research Unit and dealt with Industrial Dermatitis, its incidence, its association with certain occupations and the principles and practice of its prevention.

Anyone who has heard Dr. H. C. Maurice Williams (President of the Society of M.O.s.H. and M.O.H. of Southampton) speak, would not be surprised to hear some pungent comments on current affairs when he gave his Presidential Address to the Conference of Medical Officers of Health. He saw a great improvement in the medical staffing of hospitals. There were now fifty-seven varieties of specialist and the general practitioner is being forced by financial circumstances to care for many more patients than it is possible to deal with effectively. Shortage of houses increased the call on hospital beds which would go on increasing. Expenditure on less essential social services has gone ahead by leaps and bounds while the erection of permanent houses has been reduced by 25 per cent during the last two years.

Referring to the maternity service Dr. Williams stressed the importance of unity of control. He supported a scheme which would empower local authorities to be totally responsible for domiciliary midwifery. He thought that the disintegration of the school dental service would have been sufficient warning that private practice was not administratively equipped to carry out the detailed work of the school medical service. The future structure of

occupational health was now being studied by the Dale committee. There was a hope that the committee would decide to make local authorities responsible for the work. In conclusion Dr. Williams said that local authorities were not beyond criticism of duplication in control and referred to the missed opportunity of amalgamating the health service and the social welfare service.

Reference has been made earlier to the series of afternoon visits arranged to places of professional and historic interest. One of these was to the Queen Victoria Hospital, East Grinstead. The association of the treatment of facio-maxillary injuries with East Grinstead will be remembered. The visitors consisted of Medical Officers of Health and other medical and nursing delegates with Dr. W. S. Walton (M.O.H., Newcastle-on-Tyne) as their leader. They were conducted round the wards and departments by members of the medical staff who demonstrated cases showing the treatment by plastic surgery of injuries of hand, arm, leg, and feet and finally a case of multiple injuries including loss of fingers and extensive facial damage. Here was rehabilitation in more than one sense following the science and art of modern surgery.

On the third day of the Congress, the Section of Maternal and Child Health was presided over by Professor Hilda Lloyd, President of the Royal College of Obstetricians and Gynaecologists. It was interesting to hear from such an authority as Professor Lloyd that many women are told by doctors in view of some complication of pregnancy or confinement, that they should not have another child but are not told how to achieve this end. In conclusion Professor Lloyd deplored any division of responsibility for the care of the expectant mother and her confinement and pleaded for an obstetric service which would embody the best that doctor, midwife and hospital obstetrician could give.

The opening speaker was an obstetrician and gynaecologist, Dr. A. W. Purdie of the North Middlesex Hospital who, having reviewed the present structure, made definite proposals for the establishment of a successful maternity service. In control was to be placed the Regional Hospital Board under whom hospital management committees would employ midwives who would be supplied for domiciliary confinements by maternity hospitals or maternity departments of a general hospital. The midwife would feel she belonged to, and had the backing of, an institution with great resources. Localities would be served by hospital clinics conducted by hospital obstetricians and by local clinics staffed by general practitioner obstetricians.

The G.P. obstetrician would answer all midwives' calls for medical aid except those of extreme urgency which the midwife would make to the hospital direct. Listening to Dr. Purdie and remembering two old-established maternity hospitals and their districts, it was difficult to see the part to be played by the G.P.

Dr. Thwaites, who followed, thought that it was "one of the natural duties of the family doctor to participate whenever possible in that pre-eminently family event—the birth of the new baby in the home." He admitted changes

in general practice, in doctor-patient and in family relationship, but he was disturbed by the loss by the family doctor of his position as family accoucheur and feared that in the future he would not have the opportunity to attend sufficient confinements to attain proficiency.

Miss Bally (Country Nursing Superintendent, Lincolnshire) discussed the maternity service from the domiciliary midwife's point of view.

It was difficult to listen to the leading speakers and to the discussion without being influenced by the arguments for domiciliary midwifery and without lamenting the prophesied passing of the family doctor and accoucheur. One could not help hoping that any expectant mother in the audience would not be confused in her mind by conflicting claims for the betterment of her confinement and would be reassured by the favourable statistical trends for herself and her child to be.

While this critical review of maternal and child health was taking place, the sanitary inspectors were being addressed on "Administrative problems due to vague or complicated legislation" and on "The need for and Control of Movable Dwellings and Camping Grounds." The first speaker dealt with staff administration, Town and Country Planning Acts, Public Health Acts, Housing Acts and Food and Drug Act and their effects from the sanitary inspector's point of view. It was interesting to speculate on the repercussion of a paper on similar lines but concerned with instruction and guidance issued by higher military authority.

Thursday night brings the Congress Dinner with speeches by the President, by local dignitaries and by delegates from various parts of the country.

Perhaps at no other time is it possible to see and appreciate in the same way the variety of interest and experience represented at the Congress. The privilege of attendance is much appreciated by many delegates.

On the closing day of the Congress, the Section on Maternal and Child Health met again and discussed the care of children exposed to T.B. infection and the sanitary inspectors conferred for the second time on problems associated with shops and food-preparing premises.

At the same time those interested in Housing and Town Planning concerned themselves with District Heating and Rural Planning while more medical interests were met by papers on Tropical Hygiene. Presiding over this section was Professor B. G. Macgrath, Dean of the Liverpool School of Tropical Medicine, who raised some controversial questions on malaria control in his Opening Address. He asked firstly as to the part played by an acquired defence in individual and group tolerance to repeated infection and how far must this factor be considered in assessing the results of present-day incomplete methods of control? Recent work on antibiotics had stressed the importance of tissue defence mechanisms in the treatment of disease. The wisdom of giving drugs which will prevent or control infection as long as they are administered but may prevent the establishment of any form of protective mechanism, may be questioned. Might it not be better to allow members of the community to develop their own tolerance or immunity by repeated

infection with all its hazards? The main difficulty lay in dealing with the younger members of the community. Professor Macgrath thought there was much to be said against localized control of malaria in circumscribed areas surrounded by neighbouring hyperendemic areas over which no control was possible.

The Professor's second question concerned the ultimate effect of complete malaria control. There were risks of increasing population pressure within, and exposure as a non-immune to infection outside, the protected area. He concluded by repeating Professor Davey's and his own words: "It is not enough to eradicate malaria on the ground that it is a grave preventable disease and that it is our duty as doctors to ensure its eradication." It is also our duty to ensure that eradication will not bring worse evils."

Dr. Maelor Evans of Tanganyika followed with an account of the health problems of an over-populated primitive community and its resettlement.

Dr. J. C. R. Buchanan of the Colonial Office presented the closing paper on "Modernization of Indigenous Housing Practice in Tropical Countries" and reviewed not only the importance of general principles and detailed standards but also the unaccountable variations in different countries. Research work on materials and use of insecticides would contribute much in the future.

There was no closing general session. Delegates scatter from the doors of the last meeting place or perhaps after gossiping for a time with old friends. The old hands have probably avoided a surfeit of information by that selective ability which comes from experience of public health and political development. It seems impossible that the variety and yet community of interests represented and discussed should be without effect on a number of delegates. Many authoritative voices were to be heard and the men and women who did the work also found means of expressing themselves and their criticisms.

If for nothing else the Health Congress is notable for the excellent summaries of addresses and papers without which these notes could not have been written and which remain as a source of reference, whether it be on depopulation of African hill tracts, the inequalities of health legislation, the care of children or of the aged, the organization of maternity services, the lighting of hospitals, food hygiene or the other subjects dealt with during the Congress.

What a thing is health and where is it to be found? If the Health Congress of the Royal Sanitary Institute gives no short answers it certainly provides discussion of methods and means of attainment in a manner not easily bettered in general scope and popular appeal as well as in detail.

NOTE.—The list of delegates included Major-General T. Young (D. of A.H.), Major-General A. J. Orenstein (South African Branch R.S.I.), Captain Henry D. Hubbard (Medical Corps of the United States Navy), Surgeon-Captain A. W. McRorie, R.N., Col. F. C. Hilton-Sergeant, Dr. J. A. Struthers, Dr. H. A. Raeburn and Drs. G. E. B. Payne, R. C. Webster, G. Wynne Griffiths, D. H. Waldron (late I.M.S.), J. A. MacDougall, J. G. Hailwood, W. H. Crichton (late I.M.S.), M. L. Sutcliffe, J. B. Norwood, A. C. Crawford, E. M. Wright, J. Stokoe, M. Hunter, G. Nisbet, O. C. Dobson, P. X. Bermingham, and W. R. Martine.

LESSONS ON OPERATIONS MALAYA

BY

Captain D. C. DOW

Royal Army Medical Corps

AN OPERATION TO REMOVE CASUALTIES FROM A JUNGLE AREA

At 1700 hrs. Tuesday, April 18, 1950, the R.M.O. was advised that certain casualties had occurred to a patrol in the jungle north of Sunkai.

Wireless contact was made by the R.M.O. personally, and facts of casualties obtained, viz.:

One Officer G.S.W. Right leg, below knee, unable to walk.

One other rank G.S.W. Right shoulder.

„ Right thigh.

„ Right forearm, shattered and bleeding badly.

The R.M.O. gave brief instructions to give morphia, and pack the wound and also warnings on the use of a tourniquet which was being applied.

It was decided that the R.M.O. with a patrol should go to the scene. An "Air Drop" of two Neil Robertson stretchers and plasma was arranged for the next morning. Other medical kit was packed (including plasma in case of breakage by "Air Drop") to be carried in.

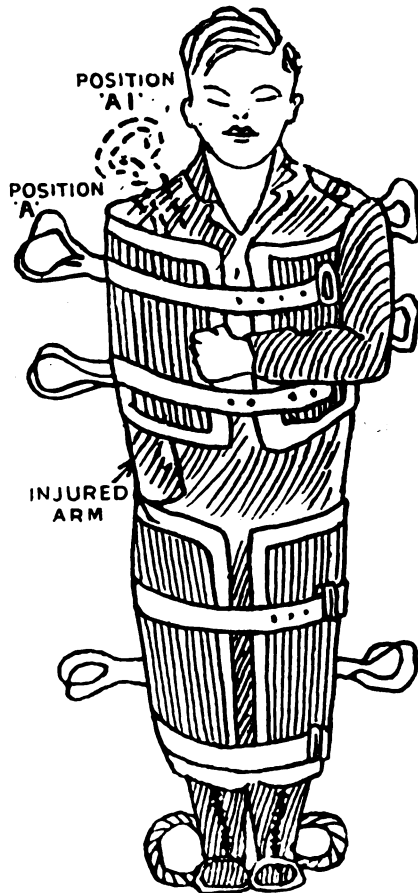
The R.M.O. remained in wireless contact until the patrol set out at 0130 hrs., arriving at the scene by 1230 hrs. The previous treatment was ascertained from the medical orderly. This was found to have been quite adequately carried out, i.e. the arrest of hæmorrhage and treatment of shock with first-aid dressing of the wounds.

Penicillin and more morphia was given to both casualties, and a plasma drip set up on the other rank. The officer's wound was dressed as well as possible. The other rank's thigh and shoulder wounds were dressed adequately, but the forearm was not redressed for fear of causing a further hæmorrhage and consequent shock. During this time the men were being formed into parties of seven and instructed on how to carry the Robertson stretcher (here the previous experience of the Padre, who had assisted in the evacuation of a previous casualty by this method, was invaluable). The method was that each party of seven should carry for fifteen minutes, then be replaced by a second party, with a break after seven minutes to change sides, so that hands were used in turn. A man was detailed to support the rope at the head end. The stretcher was

always turned to negotiate any slope in the path so that the man at the head end could give full support to the stretcher in case the others slipped.

The stretchers were then applied. It was quite impossible to keep the joint surfaces of the officer's knee separated. The application of the Thomas's leg splint in use with this stretcher (as was suggested later) is, of course, impossible.

The plasma drip was disconnected from the other patient's arm and he was transferred to the stretcher. Here it was necessary to include the injured arm in the chest-piece of the stretcher to support it.



Pressure from the carrying strap at point "A" caused considerable pain on the arm and was moved to position "A1."

The journey back was started about 1530 hrs. An advance party was sent ahead to cut and widen the path. The officer's stretcher party started off followed soon after by the party carrying the other rank. A medical orderly accompanied each party to take the pulse-rate, and the R.M.O. travelled midway

between the two parties visiting each casualty alternately to administer morphia, fluids, etc. The party bearing the other rank made slower headway than the first party (owing to the more serious condition of the patient) and at times there was up to three-quarters of an hour's walking distance between the two cases.

A camp was struck at nightfall and the casualties accommodated in shelters made from bamboo and banana-leaves. More penicillin and morphia was given that night.

The journey was continued early the next morning, and at 1400 hrs. the casualties arrived at the first river-crossing. A rope was secured across the river, and after covering the stretchers with waterproof capes (tucked inside of the folding straps) to protect the casualties from the torrential rain, they were carried shoulder high across the river. All available men were lined up with their backs to the rope, facing upstream, against the current to give assistance to the carrying parties, the current was very strong and the water came up to chest level.

The second crossing took place over the Sungei Tesong. Here the river was very much in flood and it was impossible to carry the stretchers across. A bridging party, however, constructed a rope between two trees and the stretchers pulled across on pulleys. By this time it was long since dark, but the carrying parties pressed on by torch-light to Jeram Kawang arriving there at 2245 hrs. where a temporary camp had been made (the bearers by this time were almost completely exhausted).

At this point the river is just navigable and at first-light the stretchers were put aboard sampans and floated down river to a waiting ambulance at the main road, and accompanied by the R.M.O. arrived at Kinrara Hospital at 1415 hrs. Friday, April 21, 1950.

GRANULOMA INGUINALE IN SOUTHERN RHODESIA AND ITS TREATMENT WITH ANTIBIOTICS

BY

R. R. WILLCOX

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RECENTLY the writer has had the good fortune to make a prolonged survey of venereal diseases in Southern Rhodesia. During this undertaking some 17 cases of granuloma inguinale were observed during six months in widely scattered parts of the country from Concession, north of Salisbury, to Belingwe, south east of Bulawayo. 10 were males and 6 were females. It was estimated that to find these, some 1,500 venereal diseases patients were examined in over 50 institutions and, as many had already been in-patients for long periods far in excess of those of patients with the more ordinary venereal conditions, that the incidence was probably of the order of 0.25 per cent or less of venereal diseases patients seen. In the Report (Willcox, 1949) reference was made to 16 cases: 1 additional case was seen after the Report had been written.

Some of these patients it was found possible personally to treat. Others were prescribed for and the results of treatment obtained from the medical officers concerned by post; others again were merely seen *en passant*. Those cared for personally, and some of those seen only periodically, were given streptomycin, aureomycin or chloromycetin. Although one is well aware of the deficiencies of this paper, both as regards pathological control and follow-up, it is felt, all the same, that the experience is worth recording.

Case 1: Salisbury.—A middle-aged man, exact age unknown but who remembered World War One, and who was then living in the Reserve in the north-east of Southern Rhodesia, was admitted to hospital on May 19, 1949. He had a lesion in the groin of one week's duration. On examination there was a velvety granulomatous area in the right groin about 4 cm. by 1.5 cm. in size with smaller granulomatous areas on the prepuce and near the peno-scrotal junction. There was also some generalized œdema of both penis and scrotum, a rubbery non-tender enlargement of the left inguinal glands, a papulo-squamous rash of the forearms and neck, and the left supraclavicular and both epitrochlear glands were palpable.

The next three days were spent in investigation. Three daily dark-fields proved negative for *T. pallidum* the Dmelcos and Lygranum skin tests were negative for soft sore and lymphogranuloma venereum but the Wassermann and Ide tests for syphilis, however, were both strongly positive. During this time he was given 1 gramme of sulphathiazole orally four times daily without effect. On May 22 a diagnosis of secondary syphilis was made and he was treated with a course of eight daily intra-

muscular injections of 600,000 units of penicillin in oil-beeswax again without visible improvement of either the granulomatous areas or the genital œdema. A biopsy was made and he was photographed.

He was then given 0·5 gramme of *streptomycin* three times daily for eight days until 11·5 grammes had been administered without toxic effects. The lesions had quite healed on June 13 two weeks after the onset of treatment and he was discharged on the following day.

Case 2: Concession.—A young female native with chronic granulomatous lesions of the vulva was seen here but unfortunately discharged herself before anything could be done.

Case 3: Concession.—A middle-aged male native of Southern Rhodesia, who stated that he was a small boy at the time of the first Great War, had had a penile sore in 1939 but more recently had an ulceration of the groin of one year's standing. He now had a large dry somewhat serpiginous ulceration, heaped along the edges, extending along the left groin fold backwards through the crutch and fusing with a moist ulcerated area on both sides, but predominantly on the left side, of the anus.

Dark-field examination of the lesions was negative for *T. pallidum* and the Lygranum skin test was also negative. The Dmelcos skin test for soft sore, however, was positive, possibly as a result of his penile lesions of ten years previously. The Wassermann test was negative. A few organisms only, resembling *Donovania granulomatis* were seen in the biopsy smear.

During the previous three weeks he had already received six injections of nearsphenamine and ten daily injections of penicillin in oil-beeswax (total 3,750,000 units) without effect. He was then given 1 gramme of *streptomycin* three times daily for one week (total 21 grammes) and when seen again at the conclusion of treatment the condition was static and apparently quiescent. Five days later the condition had improved still further but was not healed. No further treatment was advised. Twelve days after treatment epithelialization was taking place and he was ready for discharge on the sixteenth day.

Case 4: Marandellas.—A prematurely-aged native of Nyasaland, who had been five years in Southern Rhodesia and who was a young boy during World War One, had an ulcerated groin of four months' duration. There was no history of penile sore. When seen he had been in hospital for three months during which time he had received eight injections of nearsphenamine and bismuth, 25,000 units of penicillin four times a day for six days, 2 c.c. of anthiomaline daily for twenty days and later 1 gramme S.A.T. daily for twelve days, all without improvement.

The groin lesion, a projection of which extended medially, was about 10 cm. by 4½ cm. in size and had hard raised crusted edges while a yellow crust grossly heaped in the centre covered the whole and when he moved revealed a pink fleshy area. A biopsy was done but no Donovan bodies were seen—possibly as a result of antimony treatment.

On June 13 he was given one 250 mg. capsule of *aureomycin* three times daily and this was continued for five days until 4,000 mg. had been administered. When seen six days after the onset of treatment the lesion looked a little cleaner but otherwise there was no change. A letter from the medical officer under whose care the patient then was, written twenty-two days after the onset of treatment, announced that the granulations had closed and that the edges were epithelializing. A further letter forty-two days after the onset of treatment stated that the skin was growing well over the wound and that he was being discharged.

Case 5: Umvuma.—A young Karanga lady of child-bearing age from the Fort Victoria district was admitted to hospital with genital ulceration of six months' duration. There was a previous history of miscarriage at two months, and her Wassermann reaction was strongly positive. Commencing three months previously she had already had two courses of nearsphenamine and bismuth the first being of ten weekly injections of both drugs and the second being of six. She had also had

ten daily injections of 125,000 units of penicillin in oil-beeswax without effect. One injection only of sodium antimony tartrate had been given on the day of examination.

The woman had an extensive moist ulceration of the entire external genitalia and the condition remained unaltered by previous therapy. A biopsy specimen personally taken unfortunately was mislaid before the mobile laboratory had again been established. A supply of *streptomycin*, however, was arranged for her to be given 1 gramme three times daily for one week (total 21 gramme) and it was intended to call back and see her again after about six weeks. The result, however, was dramatic for the lesions had completely healed in two weeks and she was discharged.

Case 6: Chitando.—A man of about 25, whose father was a Shangaan and his mother a Karanga, was admitted with an hour-glass-shaped area of red granulations in the left groin, with a small velvety area on the prepuce and glans penis in addition, of two and a half weeks' duration. There was no previous history of venereal syphilis although he admitted to the "njovera" which, in the opinion of the writer, is a form of endemic syphilis found in the southern part of the country. It was not found possible to make a dark-field examination in this isolated rural clinic although a specimen of blood gave a negative Kahn reaction. A biopsy was also taken from the groin but there was not agreement on the findings.

He was given 250 mg. aureomycin orally three times a day for five days (total 4,000 mg.) and, when seen again one week later, the penile lesions were apparently healing although the groin still appeared exuberant. Unfortunately no further contact was made.

Case 7: Belingwe.—An old lady with clinical granuloma inguinale was seen at Belingwe on August 3. She had had diffuse genital ulceration since March. A second case was in a male (*Case 8*) whose lesions had been present since January while yet another, a male, was seen at Shabani (*Case 9*).

Case 10: Fort Usher.—This young man had been an in-patient for fifteen months with bilateral ulcerated granulomatous groins with additional smaller lesions on the glans and shaft of the penis and on the scrotum. Repeated Wassermann tests had been negative. In the present year he had received ten weekly injections of arsenic and bismuth and, a month previously, three million units of penicillin all with no result. It was decided to treat him with aureomycin, and he was given one 250 mg. capsule three times daily for five days (total 4,000 mg.). He was seen again nine days later by which time he was delighted with his progress, the penile lesions healing well and the groin lesions being smaller. A letter on August 30, however, ten days later, stated that although the condition had improved considerably it had again deteriorated. He was prescribed *streptomycin* 3 grammes daily for one week and on October 14 his condition was stated to be much improved. Shortly afterwards he healed completely and a letter dated January 17, 1950, stated that he was working locally and that there had been no recurrence.

Case 11: Bulawayo.—An indigenous native of Southern Rhodesia, aged about 30, had a small patch of chronic granulo-ulceration in the left groin of one month's duration. He had already received 20 antimony and six neo-arsphenamine and bismuth injections without healing. His Wassermann was positive. Biopsy failed to show *D. granulomatis*. He received 0.5 gramme streptomycin twice daily for three days after which time the groin healed and he was discharged seven days after the onset of treatment.

Case 12: Bulawayo.—A young female Southern Rhodesia native had extensive ulcero-granulomatous lesions of the whole vulvar area and around the anus. The inguinal glands were not involved and the blood Wassermann reaction was negative. There was a three months' history but she was so far untreated. A scanty number of organisms resembling *D. granulomatis* was found by biopsy.

On August 13 she was given one 250 mg. capsule of aureomycin orally three times daily for five days. Seven days later the lesions were cleaner but not reduced in size and no further treatment was given at this stage. Seventeen days after treatment about

half of the area affected had healed or was obviously healing. Further treatment, however, was asked for and before further supplies of the antibiotic could be obtained the patient was given anthiomaline. After receiving 14 c.c. in nineteen days the lesions had healed and she was discharged. The consort of this case was unaffected.

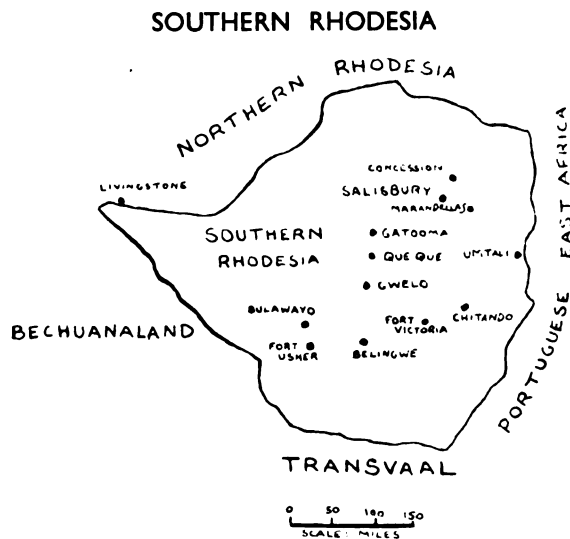
Case 13: Gwelo.—A middle-aged female native, who had been in hospital for four months, had had extensive vulvar and peri-anal ulceration for one year. She was also cachectic.

She had received numerous courses of sulphapyridine, two full courses of neoarsphenamine and bismuth, one course of sodium antimony tartrate and four weeks of treatment with penicillin in oil-beeswax all without effect. It was recommended that she be given streptomycin. I was later informed that she received 20 grammes over ten days without any immediate effect although a sudden improvement took place three-and-a-half weeks after cessation of treatment only to relapse subsequently with phases of local healing and breakdown.

Case 14: Que Que.—A young native admitted three weeks previously on account of granulomatous lesions of the groin and prepuce stated that they had been present a week before admission. He had already received three neoarsphenamine and three bismuth injections. Streptomycin was recommended.

Case 15: Gatooma.—A married male native of Nyasaland, ten years in Southern Rhodesia, had granulomatous lesions in both groins and on the penis of two months' duration. He had been an in-patient for three weeks and had received three weekly injections of neoarsphenamine and bismuth without effect. He was given streptomycin 3 grammes daily for seven days and the lesions healed in twelve days.

Case 16: Gatooma.—A male native with lesions in the left groin had been an in-patient for eight and half months and had had his lesions for two months before that. He had received two full courses of neoarsphenamine and bismuth and also 300,000 units of penicillin in oil-beeswax once daily for one week all without effect. He was given streptomycin 3 grammes daily for seven days and the groin had healed by the thirteenth day.



Case 17: Salisbury.—A male native of Southern Rhodesia had a velvety granulomatous lesion of the coronal sulcus about the size of an olive of two and a half months' duration. Three dark-field examinations were negative for *T. pallidum* and the serum

Wassermann reaction was also negative. He was treated with one capsule of *chloromycetin* given orally three times a day for two days followed by one capsule twice daily to a total of 13 tablets (3.25 gramme). Healing was noticeable by the fifth day and he had completely healed in eight days when he was discharged from hospital. No other treatment was given.

Information was forthcoming later that the patient was again in hospital some nine weeks later with a sore on the site of the original lesion. He was given one injection of 2.4 mega units of procaine penicillin with aluminium monostearate, improved but was admitted a few days later with a further recurrence. This was also treated with a similar dose of penicillin and the sore apparently healed in a week, the serum Wassermann remaining negative. A few days later the sore broke down again. This case must be regarded as one of relapse.

DISCUSSION

Granuloma venereum, described by Greenblatt (1949) as "the *enfant terrible* of the diseases which plague the South" is considered in the U.S.A. as being on its way to extinction as a result of modern treatment with antibiotics.

The disease is certainly present in tropical and sub-tropical Africa and is met in Nigeria and Sierra Leone (Willcox, 1946). In these places rectal strictures are encountered in the females. Possibly because the disease is less prevalent in Southern Rhodesia, no indisputable case of rectal stricture in females was personally seen during the venereal diseases survey. Its large-scale eradication by antibiotics has not yet been attempted in Africa.

The responsible organism, *Donovania granulomatis*, has been shown to be sensitive to streptomycin both in the chick embryo (Rake and Dunham, 1947) and in the clinical infection (Greenblatt *et al.*, 1947 *a* and *b*), and several series of considerable size (Kupperman *et al.*, 1948; Chen *et al.*, 1948; Zimmerman and Smith, 1948) proved beyond a doubt that streptomycin was the best curative agent yet discovered for this disease.

Aureomycin was also shown to be effective in granuloma inguinale. Wright *et al.*, 1948, and Greenblatt *et al.*, 1948c reported success with 5 patients who had proved resistant to streptomycin and prefer the newer drug. The latter workers also state that the drug is only really effective if given by the oral route and consider that 20 grammes given over ten days is an average effective dose. Chloromycetin was used in one case mentioned in this report.

SUMMARY

(1) 17 cases of granuloma inguinale were observed during a six months' survey of venereal diseases in Southern Rhodesia. All were Bantu negroes and 11 were males and 6 females.

(2) 10 of the cases had had lesions for longer than three months and the average duration of symptoms was four-and-a-half months.

(3) 8 patients were treated with streptomycin (1 an aureomycin failure), 4 with aureomycin and 1 with chloromycetin.

(4) Most of those treated with streptomycin were given 21 grammes over one week and this proved effective. Those that received aureomycin had only 4,000 mg. over five days and this was insufficient. The one patient treated with only 3.25 grammes of chloromycetin (chloramphenicol) likewise relapsed.

(5) The response to modern treatments, which allowed patients to be discharged from hospital within a few days or weeks, having previously sometimes having spent many months receiving other ineffective drugs, was most dramatic.

(6) It is concluded that granuloma inguinale is present in Southern Rhodesia and that in the Bantu the reaction of the disease to antibiotics is similar to that in the American Negro.

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At Random

I—INDIVIDUAL HYGIENE

Everyone His/Her Own Hygienist

THE whole trend of modern conditions of war appears to be towards specialization, to the production of technical specialists, the trained isolated group fighters and the individuals taught to work and act alone in the fog and confusion of battle.

Each individual, however, whether for himself or for the group which he/she commands, needs training in many other aspects apart from his/her specialism. One of those aspects which closely concerns the Medical Services is that of *individual* training in hygiene and *personal* hygiene.

In the airborne group, the deep-penetration patrol, the infiltrating infantry, in the organised resistance-movement, in the isolated outpost and in the attached liaison mission it is the *personal training in hygiene* which counts in the preservation of the efficiency of the individual.

With the present shortages of man- (and woman-) power, with the increased time-factor in training and with the emphasis on individual performance the hygienic protection of each individual becomes of greater and greater importance as the value of the trained individual increases. In each monthly issue of the *Journal* accounts of operations and discussion of ways and means emphasize the value of the trained individual.

General hygienic protection can be taught and is given to the mass and to the individual and forms already a considerable part of the Services' training; but, fundamentally, it is the individual's training in and reaction to hygiene which counts.

Is this aspect of training receiving enough attention in the varied mass of knowledge which modern conditions impose? Is the time available for and allotted to such training sufficient? Is the modern Service man (or woman) being sufficiently taught to be able to protect himself and herself to maintain personal health and value in peace or war? Is, in fact, each being taught to be a competent individual hygienist?

II—SIGNATURES

.....; the patient remains I.S.Q., and now has no complaints.



Captain, R.A.M.C.,
O i/c X Ward.

.....; in rear of point r 50 is a spot suitable for an A.D.S. and is recommended.



Lt.-Col., R.A.M.C.
Comdg. 999 Field Ambulance.

.....; the Board therefore recommend three months sick leave.



Colonel,
A.D.M.S. 100th District.

.....; an efficient and promising young officer who should go far.



Major-General,
D.D.M.S.

Why is it that doctors, professors, lawyers and the clergy are so notorious for, and in fact too often have, such extremely bad handwriting as to be practically illegible, both in the text of their writing and in their signatures.

In the text it may be possible to decipher the main or important words from the context, from their general appearance, from an intelligent or other guess. But with the signature this hardly is possible and an irritated assumption may well be wrong.

Surely a signature worth writing at all is worth writing so that others can read it! !

The members of these professions, even the Professors, Specialists and Authorities amongst them, have, we may presume, had a considerable education based on a supposedly good grounding. It has certainly cost enough, even before the present price range of labour and commodities. The outlay of some £1,000 to £3,000 on each education should surely have secured an adequate grounding in the three Rs!

And yet the results shown above can often be seen in Case Notes, Board Proceedings, Appreciations and Confidential Reports.

For contemporaries, bank-managers and chemists the decoding of these cipher-signatures may be a possible or even an easy accomplishment. We understand that bank-managers and chemists have special tuition in the art: but for subsequent readers-with-ordinary-education the task may well be impossible.

May not we, the subsequent readers-of-ordinary-education, in the Services, then insist on an adequate solution to this ever-recurring difficulty? Is it too much to ask that the Professor or Specialist should sign a legible signature, or alternatively should print his nomenclature beneath his hieroglyph or possibly that the future aspirants to these professional heights should be trained on entry into the Services and that the Junior or, perhaps, even the Senior Course at the College should include an elementary section on signing legible signatures.

Clinical and Other Notes

A PORTABLE ANÆSTHETIC APPARATUS FOR F.S.T. WORK

BY

Captain G. J. HADFIELD

Royal Army Medical Corps

AND

Captain A. J. HEBER

Royal Army Medical Corps

WHILE forming a Mobile Surgical Team operating in North Malaya we found it necessary to have some simple form of Boyle's machine sufficiently light to travel as luggage in Auster Aircraft and sturdy enough to stand up to travel in Jeeps and trucks.

The main fittings of an Army Field pattern Boyle's machine were fitted into a box 14 in. × 14 in. × 2 ft. high and weighing 52 lb. ready for use.

Two cylinders only were carried; one a standard nitrous oxide cylinder and the other a small oxygen cylinder, the size of a standard nitrous oxide cylinder. The latter was specially marked so that it could not be confused and to economize in weight and size.

New cylinders were taken out for each separate trip and it has been calculated and found in actual practice that they contain sufficient gas for 3 (three) hours running.

The following photographs below show various views of the apparatus:



FIG. 1.—Box opened and apparatus assembled.



FIG. 2.—Apparatus packed ready for travel with lid opened.
(Viewed from above.)

We would like to thank Capt. H. Perry, R.E.M.E., for his help in making the Cabinet for the apparatus and the A.D.M.S. Malaya District for his permission to publish this article.

Events of Interest

THE AT HOME

THE Annual At Home was given at the Headquarter Officers' Mess, Millbank, on Friday, June 23.

Her Majesty, The Queen, as Colonel-in-Chief of the Corps was the Guest of Honour and was received by the Director-General, Sir Neil Cantlie, at the entrance to the Mess.

The Director-General then introduced the Colonels Commandant, the Commandant of the College, the Heads of Services, Major-General Kingsley Norris, Director-General of the Australian Army Medical Services, and their wives.

Her Majesty then met the senior and many other officers of the Corps and their wives in the rooms of the Mess, which were beautifully decorated, and had tea in the Drawing Room with the Director-General and Colonels Commandant.

There were 450 officers and their wives present who fully appreciated the gay and colourful appearance of the Mess and the scrumptious tea, while the Band of the Royal Army Medical Corps played on the lawn outside the Mess.

The Staff of the Headquarter Mess deserve full credit for an outstanding and most enjoyable At Home.

THE CONSULTANTS DINNER, 1950

THE Annual Consultants' Reunion Dinner was held at the Headquarter Officers' Mess, Millbank, on Thursday, July 20, 1950.

The Director-General, Sir Neil Cantlie, presided, while the Adjutant-General, Sir James Steele, and the Matron-in-Chief, Brigadier A. Thomson, were guests of the Mess. The Orchestra from the Band of the Welsh Guards played during the evening.

Following the Loyal Toasts the Director-General spoke on the present-day problems of the Corps and its future, and went on to say that this was the only opportunity which presented itself for the Army Medical Services to show their regard, affection and thanks to the Adjutant-General before his retirement. The Director-General stressed what a great friend to the Medical Services Sir James Steele had been, and how, during his tenure as Adjutant-General, and

largely owing to his powerful support, success had been achieved in improving the pay and conditions of the Army Nursing Service.

After his health had been drunk with musical honours Sir James Steele recalled the many happy occasions upon which he had been present in the Mess and the many friends he had made in the Army Medical Services. He hoped that the efforts being made to improve the pay and conditions of the R.A.M.C. and R.A.D.C., in which he had been deeply interested, would come to fruition.

The following were present :

The Director-General, General Sir James Steele, Brigadier A. Thomson, Major-General Sir Heneage Ogilvie, Major-General Sir H. L. Tidy, Major-General Sir A. Stott, Major-General W. E. Tyndall, Brigadier E. R. Cullinan, Brigadier Myles Fornby, Brigadier D. E. Bedford, Brigadier S. Smith, Colonel V. W. Dix, Brigadier P. Wiles, Brigadier D. B. McGrigor, Brigadier A. S. Daly, Brigadier M. Rosenheim, Brigadier C. Donald, Brigadier W. Ritchie Russell, Major-General D. C. Monro, Brigadier Sir Arthur Porritt, Major-General H. J. Higgins, Brigadier E. R. Boland, Brigadier R. A. Broderick, Colonel S. H. Woods, Brigadier E. E. Prebble, Colonel A. E. Campbell, Lieut.-Colonel A. B. Carter, Lieut.-Colonel A. N. T. Meneces, Brigadier R. O. Ward, Colonel W. A. D. Drummond, Brigadier St. J. Dudley Buxton, Colonel Sir James Walton, Major-General F. Harris, Major-General F. R. H. Mollan, Brigadier Sir Harry Platt, Major-General J. C. A. Dowse, Colonel H. Yellowlees, Brigadier E. A. Bennet, Brigadier F. Howitt, Brigadier W. A. Daggett, Brigadier C. M. Morgan, Brigadier R. M. B. Mackinnon, Brigadier T. C. Hunt, Brigadier M. F. Nicholls, Brigadier F. M. Lipscomb, Colonel E. H. Hall, Brigadier H. K. Ashworth, Brigadier W. W. Boggs, Major-General J. Bennet, Brigadier E. Schleseinger, Major-General R. Priest, Major-General F. S. Irvine, Brigadier J. C. Hawkesley, Brigadier R. Marnham, Brigadier R. R. Bomford, Brigadier R. J. Rosie, Brigadier G. W. B. James, Major J. C. Watts, Major J. B. Neal, Major D. Moynagh, Major P. W. Kippax, Brigadier A. Sachs, Brigadier D. C. Bowie, Brigadier E. Bulmer, Colonel L. Colebrook, Brigadier J. Bruce, Brigadier A. G. Harsant, Lieut.-Colonel C. A. de Candole, Major E. J. Bowmer, Lieut.-Colonel J. A. MacDougall, Major P. H. Shorthouse, Major G. F. Anderson, Major H. W. Peck.

Extracts from Current Literature

DRAMAMINE TRIALS IN THE UNITED STATES NAVY

"The Military Surgeon": June 1950, p. 446

DRAMAMINE has been administered to some 900 men, including marines, Coast Guard sailors, aviation cadets, submariners, midshipmen, destroyer and cruiser sailors, and men aboard smaller craft, and the following is a summarization of the investigations. In no instance was there evidence of severe toxicity; although in one small series, reported herein, 100 ml. of dramamine produced drowsiness in 25 per cent of the individuals. Aboard three weather vessels of the United States Coast Guard a *placebo* appeared to be as beneficial as the dramamine itself.

Total										Number of men
										906
Camp Lejeune, N.C. (marines)	...	...	...	...	...	...	...	...	...	96
U.S. Coast Guard (5 ships)	...	...	...	...	...	...	...	...	...	119
Atlantic Fleet (one ship reporting)	...	...	...	...	...	...	...	...	...	57
Airsickness in Aviation Cadets (Pensacola, Fla.)	...	...	...	...	...	...	...	...	...	100
Submarine (one reporting)	...	...	...	...	...	...	...	...	...	13
Airsickness (U.S. Geological Survey)	...	...	...	...	...	...	...	...	...	61
Midshipmen Air Cruise 3B	...	...	...	...	...	...	...	...	...	65
Fleet Logistic Support Wing, Seattle to Kodiak	...	...	...	...	...	...	...	...	...	38
U.S.S. Meredith (D.D.-890)	...	...	...	...	...	...	...	...	...	132
Four Destroyers of Destroyer Squadron 7	...	...	...	...	...	...	...	...	...	115
Yacht Race, Newport-Annapolis Ocean Race	...	...	...	...	...	...	...	...	...	12
U.S.S. Edisto (AGB-2), Operation NANOOK II	...	...	...	...	...	...	...	...	...	55
U.S.S. Eberle (D.D.-430)	...	...	...	...	...	...	...	...	...	30
United States Naval Hospital, Bethesda, Md., Nausea and Vomiting of Pregnancy	...	...	...	...	...	...	...	...	...	13

These rather widely separated studies were discussed collectively because of their similarity, although it is recognized that they are not strictly comparable with one another nor with previous reports by other investigators. Nevertheless, they demonstrate that this new drug is prophylactic against motion sickness in 50 mg. doses and that it is also effective on marksmanship. Dramamine is least effective in the treatment of nausea and vomiting of pregnancy when given in 50 mg. doses. Its action, when favourable, is prompt, and the duration of effect of a single dose is from three to four and a half hours. The toxic action of dramamine is practically nil. Undesirable side-actions are rare, although drowsiness may occur in approximately one-fourth of those who receive 100 mg. of this drug.

NOTES

from the proceedings of the 13th Session of the International Bureau of Medico-Military Documentation, Monaco, May 3 to 7, 1950

*Held under the presidency of M. le Medecin General Inspecteur Jeune,
Vice-president of the International Committee of Military Medicine
and Pharmacy*

THE report contains a number of subjects which were discussed, including "Protection from the A.B.C. War"; "Report of the New Geneva Conventions"; "The Identification of Medical Personnel and International Badges"; and the following:

IV. Antibiotics in the Field

There was submitted a very thorough study of the surgical and medical aspects of this question by Med-Col. Talbot and Med-Commandant Molinier.

The study concluded with the following observations in the form of a resolution:

"The 13th session of the International Bureau for Medico-Military Documentation requests that for a future Congress a study be prepared dealing with:

(1) Antibiotics as primary prophylaxis in the case of infectious complications of war wounds—for teams in advanced positions.

This primary prophylaxis must be systematic and applied very early; it must be as polyvalent as possible and along the lines of a standardization admitted by all surgeons.

(2) Therapy by means of antibiotics—for the surgical unit proper.

This rational therapy makes use of agents particularly adapted to the germs in question (e.g. streptomycin against the colon bacillus).

It is indisputable that better results are obtained with this method of prophylaxis by antibiotics.

Even though it brings additional security it gives no ground for *deliberately* contravening the established rules for front-line surgery.

It would be advisable to review the situation in the light of these new data regarding therapy by antibiotics and to consider which of the rules of surgery should be cancelled for all surgeons called upon to work in the front line.

V. *Treatment of burns*

Reports were submitted by Med-Gen. Bergeret, Med-Lt.-Col. Cuzin, Med-Principal Y. Guilbert.

The facts showed that in the treatment of serious burns, the most important feature is the general treatment, in particular the prevention of shock by plasmotherapy. Local treatment must be only complementary to this. Reviewing the essentials for the latter the authors have provided some guidance amongst the diversity of proposed therapies; medicaments such as tannic acid (tannage), mercury chromate, gentian violet, picric acid, boric acid, "cetavlon," biological methods (antibiotics) and physical methods (compression, bathing). For each of these the authors specify what is indicated or contra-indicated.

The authors conclude by emphasizing the necessity for the organization of Centres specializing in the treatment of burns.

VI. *Training of Army Medical Officers*

Reports were submitted by Med-Gen. Dutrey and Med. en-Chef 2 Class Bernard.

These reports brought to light the necessity for a very wide general training but with surgery predominating; for supplementary instruction in medicine for military work; and for training more specialists with particular emphasis on future needs.

VII. *Commission for the Study of Medical Supplies*

The Vice-President of the I.R.C.C., Dr. Gloor, submitted a statement about the resumption of the activities of the International Commission for the Study of Medical Supplies.

He asked that the International Committee of Military Medicine may continue as in the past to support this research and secure the co-operation of Medical Services from all Armies.

VIII. *Towards a World Medical Statute*

During its 13th session the Bureau took up again the study of a proposal which had been drawn up in February 1950 by a Commission of lawyers and doctors.

In addition a number of "Resolutions" were passed and a comprehensive series of congratulations and thanks issued.

CORRECTION

CORRESPONDENCE, APRIL 1950

Page 214, line 13—for F.D.S.s read F.D.L.s (Forward Defended Localities).

Reviews

THE SULPHONAMIDES, By F. Hawking, M.D., and J. Stewart Lawrence, M.D.
M.R.C.P. London: H. K. Lewis and Co. 1950. Pp. 389. Price 42s.

While no outstanding changes have taken place in the use of sulphonamides in chemotherapy since 1945 when the Medical Research Council issued the White Memorandum (revised), the Medical Use of the Sulphonamides, much that was applied tentatively five years ago is now founded solidly on successful practice. For this reason the detailed review (presented in this work) of all the medical aspects of these drugs will be welcomed. It covers a wider range of preparations than its predecessor as since 1945 opportunities have presented for a detailed study of continental literature, with advantage of completeness. This is mainly apparent in the chapter on chemistry. The authors point out that the actual preparations in use are comparatively few, and the remainder of the work has mainly reference to these. Emphasis is laid on the pharmacological aspect of the subject, an appreciation of which is essential for rational use. Information on the application of these preparations to the treatment of the various infections in which they have been used is encyclopædic and always well and briefly summarized. Toxic manifestations receive the detailed treatment they merit. Where treatment with antibiotics has supplanted the use of sulphonamides this is clearly shown, and where a system of treatment with the two combined is the best practice the role of each is carefully assessed. The work will be highly appreciated by all whose practice of chemotherapy is based on the principle underlying its use.

J. D.

OPERATIVE SURGERY. By various authors. Edited by Alexander Miles and Sir James Learmouth. Third Edition. Oxford Medical Publications.
Pp. 559 with 235 illustrations.

Much new matter has been introduced since the last edition of 1936. This is a handy volume describing the operative methods in use at the Edinburgh School of Surgery.

It is easily read—and the illustrations are clear and helpful.

Figures 109, 110, 111 appear to be in reverse order.

Neurosurgery is not included; and although the general surgeon might well need to know the technique of ovariectomy and salpingectomy, these operations are not described.

There are, however, five pages given to total laryngectomy. A. G. H.

PYE'S SURGICAL HANDICRAFT. Sixteenth Edition. Edited by Hamilton Bailey. John Wright and Sons Ltd. Pp. 724 with 830 illustrations. Price 25s.

This edition well maintains the standard of its predecessors—it is full of useful information on all aspects of minor surgery. A very useful companion for the surgical undergraduate and young postgraduate, and most useful for instruction of, or reference by, surgical and operating room nursing staff.

A. G. H.

THE RHEUMATIC DISEASES. By G. D. Kersley, M.A., M.D.Cantab., F.R.C.P., T.D., with a Foreword by Sir Francis R. Fraser, M.A., M.D.Ed., F.R.C.P. Third Edition. London: Wm. Heinemann Medical Books Ltd. 1950. Pp. 143. Price 15s.

This work gives the knowledge required for an understanding of the rheumatic diseases and an appreciation of their management in simple language and with strict economy of text. It is essentially a guide for those engaged in clinical work, with the addition of short chapters on the interrelationships found in this group of diseases and on the possible significance of adrenal and pituitary hormones, and the polysaccharides and hyaluronidases, in their pathology. The author achieves his purpose of being precise admirably. While all the clinical chapters evoke praise in this respect, a chapter on special treatments calls for particular mention. In this are described methods, the indication for their use and what they are intended to effect. There are 26 plates of excellent illustrations drawn from microphotographs, X-rays and apparatus and treatment in action. The book will give much pleasure to its readers.

J. B.

SYPHILIS. ITS COURSE AND MANAGEMENT. By Evan W. Thomas, M.D. New York: The Macmillan Company. 1949. Pp. 317.

This monograph is not intended as a monumental work, but it is an outstanding presentation of its subject complete within the limits its author sets himself. All clinical aspects of the subject, excluding any systematic attempt to discuss differential diagnosis, are reviewed, some at considerable length, such as the course of the untreated disease. There is also comprehensive treatment of the subject of serological tests and their interpretation. Clinical manifestations are set forth clearly and problems bearing on diagnosis are discussed with balanced reasoning and restraint productive of many wise rules for those

who may use the book. The main theme is perhaps the role of penicillin in treatment of all stages and forms of the disease, and many factual data bearing on the results of different schedules of dosage are given. The author, however, is more interested in the principles underlying penicillin therapy. In summing up his consideration of the activity of penicillin in treatment of the disease he states: "We do not know whether or not the syphilitic virus is completely destroyed during penicillin therapy, but experience suggests that this is true in most cases, and that, in the absence of clinical or serologic relapse, the infection is extinct in spite of prolonged persistence of positive serological tests in many patients."

The book provides strong evidence in favour of a policy of treatment relying on penicillin without the adjuvant use of the older conventional methods with arsenic and bismuth. Although Herzheimer reactions have not proved alarming in the author's experience, and although he considers true therapeutic paradox to be a rare complication of treatment, a conservative attitude is adopted to the use of bismuth in such cases as in the initiation of treatment of syphilitic heart disease.

J. B.

Notices

CORPS WEEK 1951

Corps Week will be held from June 3 to 9, 1951. The details will be as follows:

<i>Date</i>	<i>Event</i>
June 3	Church Parade. Companies' At Home to parents and friends.
June 4	Heats, Swimming Gala—Aldershot Military Swimming Baths.
June 5	Swimming Gala—Aldershot Military Swimming Baths—1900 to 2100 hours. McGrigor Mess Supper Party. No. 1 Company All Ranks Dance.
June 6	Cricket Match—Officers R.A.M.C. v. R.A.O.C. at Officers' Club Ground. Aldershot—all day. R.A.M.C. Ball at Officers' Club—2100 hours. Heats of the Corps Sports.
June 7	King's Birthday Parade—a.m. Corps Sports—1400 hours. Other Ranks Dance—R.A.M.C. Depot.
June 8	Corps Officers' At Home—H.Q. Mess, Millbank—1600 to 1800 hours. Corps Officers' Dinner—Trocadero Restaurant, London—7.30 p.m. for 8 p.m.
June 9	R.A.M.C. Golfing Society Summer Meeting—Fleet.
	June 23 will, of course, be celebrated as Corps Day.

THE ARMY CRUSADERS (ARMY OFFICERS) ASSOCIATION FOOTBALL CLUB

A MEETING was held at the Royal Military Academy, Sandhurst, on May 4, 1950, with the object of reviving the above Club.

The objects of the Army Crusaders are:

- (1) To give Officers an opportunity of interesting themselves in Army Football and of getting games of the type to which they are accustomed.
- (2) To run a series of matches against as many Soccer-playing Public Schools as possible.
- (3) To play the officers of the Sister Services.
- (4) To further the true amateur spirit of the sport.

Membership of the Club is open to Officers of the Regular Army (including National Service Officers), Reserve of Officers and Territorial Army, and Officer Cadets of the Royal Military Academy, Sandhurst.

The rates of subscription are as follows:

Life Membership	...	...	£2	2s.	0d.
or					
Annual Membership	...	...		5s.	0d.

It is hoped to defray any match expenses incurred by individual players.

Several fixtures have already been arranged for the season 1950-51, the first one was for October 1950. These fixtures include a match against the Officers of the Royal Navy. Although no fixtures are being arranged in the north of England at present, it is hoped to arrange a fixture list with schools in the north later on.

It is hoped to arrange at least one trial match in the Aldershot area in the second half of September. Officers desirous of playing next season are asked to submit their names before August 1, 1950, if possible.

Applications for membership or for further information should be sent to:

Captain N. W. WATSON, R.A.E.C.,
Hon. Secretary,
Army Crusaders Football Club,
Royal Military Academy, Sandhurst,
Camberley,
Surrey.

JOURNALS RECEIVED

Transactions and Studies of College of Physicians of Philadelphia, Journal of Medical Association of Eire, South African Medical Journal, Practitioner, Newcastle Medical Journal, Medical Journal of Australia, Medical Press, North Wing May Sheffield Medical School, The Staple, East African Medical Journal, Health Bulletin, Journal Royal Egyptian Medical Association, Canadian Army Journal, Lancet, British Medical Journal, Bull. of John Hoskins Hospital, St. Barts. Hospital Gazette, Journal of the Royal Sanitary Institute, Empire and Commonwealth, Clinical Journal, Post Graduate Medical Journal, Clinical Journal, New Zealand Medical Journal, Military Review, British Medical Bulletin, Proc. R.S.M., Journal of the R.A.S.C., Journal Royal Inst. Public Health and Hygiene, Edinburgh Medical Journal, Medical Journal of Australia, Brit. Journ. of Surgery, Military Surgeon, Glasgow Medical Journal, Tropical Diseases Bulletin, Medicine To-day and To-morrow.

Journal

OF

THE

Royal Army



Medical Corps

ISSUED

MONTHLY

EDITOR

LIEUT.-GENERAL SIR TREFFRY THOMPSON,
K.C.S.I., C.B., C.B.E., M.A., D.M.

MANAGER

MAJOR H. W. PECK, R.A.M.C.

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Original Communications

GURKHA BRONCHITIS

**A Report on an Investigation of Acute Bronchitis Amongst
Gurkha Troops from The British Military Hospital, Kluang**

BY

Captain D. Ç. MORLEY

Royal Army Medical Corps

THE large number of young adult males who frequent the sick parade with a cough makes an immediate impression on the Medical Officer fresh to the East.

These attacks of bronchitis do not necessarily clear up quickly and it was decided to discover whether they fell into one particular syndrome. An investigation was carried out over a period of six months at the Military Hospital, Kluang. This is a small hospital inland in south Malaya. It draws on two Gurkha training wings for most of its patients. There is very little change in the climate; neither the rainfall nor the daily range of temperature vary consistently with the time of year.

There was a big increase in cases during the period January to March; this was probably due to the arrival of a large batch of young Gurkha recruits fresh from Nepal.

A similar condition has been described by Shone and Passmore (1943). They were particularly interested in the discovery of high cold agglutinins. Unfortunately that account was not available when the present series were seen. Cold agglutination certainly occurred and was seen when blood slides were taken. It is possible that the high sedimentation rate was due to cold agglutination occurring in the Westergren tubes.

The frequency of bronchitis was estimated for the eighteen months prior to the present investigation. Fortunately the records for the four races that used the hospital were kept separate. A diagnosis of bronchopneumonia was

included with that of bronchitis, a study of the case records will show that these two are frequently stages in the condition.

<i>Race</i>	<i>Total admissions</i>	<i>Total chest conditions</i>	<i>Bronchitis</i>
Europeans	812	40 (4.9 per cent)	30 (3.7 per cent)
Gurkhas	431	140 (32.3 per cent)	102 (23.3 per cent)
Malays	186	32 (17.2 per cent)	25 (13.4 per cent)
Sinhalese	475	92 (19.4 per cent)	64 (13.5 per cent)

(Percentages are for the total of each race admitted.)

METHOD OF INVESTIGATION

Definite criteria were laid down to decide what patients should be included in the series. Patients who showed any *three* of the following features were admitted into hospital, for investigation.

- (1) Pain in the chest as a symptom.
- (2) Presence of a cough.
- (3) Temperature over 99°.
- (4) Abnormal added sounds on auscultation of the chest.

One case of proved malaria, and one case of tuberculosis were excluded, although they showed three of the above features. Patients were examined clinically, particular care was taken in examination of the skin and mucous membranes for any evidence of malnutrition. A history of past coughs and any chest trouble was taken, all patients were asked concerning any hæmoptysis, and the amount of tobacco smoked was recorded.

LABORATORY INVESTIGATIONS

Routine examinations on admission included a white cell count and differential; in the majority of cases 500 cells were counted in the differential. An estimation of the blood sedimentation rate was made, using the Westergren technique. The stool was examined microscopically for ova. The sputum was examined for acid-fast bacilli: in most cases only one specimen was examined unless there was any suspicion that the case was tuberculous, when six or more specimens were examined microscopically, and also cultured.

An X-ray examination of the chest was made on all cases; it was unfortunate that it was not feasible to carry out more bronchograms.

RESULTS

Forty-two patients were fully investigated. They fall into two groups: there were 26 severe cases, and 16 mild cases.

The 26 severe cases will be discussed as they show considerable similarity. They are selected out of the total 42 cases as they all showed an X-ray change.

The name "bronchitis" may cause surprise when in fact the majority of cases develop a secondary bronchopneumonia. However, the first, and, as far

as the patient is concerned, the worst symptoms are of a tracheo-bronchitis; it is therefore felt that "bronchitis" is a more useful name for the condition.

THE MAIN FEATURES OF THE MORE SEVERE CASES OF GURKHA BRONCHITIS

	<i>Number of cases and percentage</i>
Pain felt over the front of the chest	19 (73 per cent)
No pyrexia after the day of admission	15 (58 per cent)
A higher pyrexia in the morning than evening on three successive days	6 (Out of 11 with pyrexia)
A B.S.R. over 80 mm./hr.	6 (23 per cent)
A B.S.R. over 40 mm./hr.	22 (85 per cent)
A B.S.R. over 40 mm./hr. and yet no pyrexia	10 (38 per cent)
An absolute eosinophilia greater than 1,000 cells/c.mm.	No cases
Total severe cases, all with X-ray changes at the lung bases	26 (100 per cent)

SYMPTOMS AND SIGNS

The most common presenting symptom was pain in the chest; occasionally it was felt over the trachea, in the neck. The pain was central or to one side of the sternum; if to one side of the sternum it was usually found that the lung base most affected, clinically and on X-ray, was on the same side. Headache was an almost universal symptom. It might be severe although there was no pyrexia. The cough was a dry hacking cough; it was usually worst in the morning. In a certain number of cases there was a secondary infection, and in these cases a quantity of purulent sputum was produced. A mild earache with a relative deafness was a not uncommon finding. The drum appeared to be opalescent with mild injection. It was presumed that there may have been a catarrhal spread up the Eustachian tube.

Only in seven cases was there any history of a previous cough before the man's arrival in Malaya. In the majority of these attacks the cause of the cough seemed to be different from the present condition.

Three cases gave a history of a recent hæmoptysis. The tobacco habits of all these men were very moderate, the majority smoked less than ten cigarettes a day.

Many of these men were miserable on admission. This was in part due to their troublesome cough, but also due to their headache and pain in the chest: the latter was present all the time and only aggravated by the cough.

The temperature and pulse were raised on admission, but frequently settled during the first day in bed. An unusual finding was made in 6 of the 11 that showed a raised temperature. In these 6 the temperature was higher in the morning between six and ten o'clock, than in the evening; this was only considered significant if it occurred on three successive mornings. In some cases it was well marked (*see copy of chart in Case 29*).

At the start of the investigation it was considered that a deficient diet might be a precipitating factor. Investigation of the skin and mucous membranes did not yield any evidence to support this. Also it was fairly definite that no

deficiency could have occurred on the Army diet as long as the man did not leave part of his food for religious, or other reasons.

The nose and throat were normal in the majority of cases. The chest showed clinical changes in all cases. Any change in the note on percussion or in degree of movement was too slight to be significant. On auscultation, moderate-to-coarse crepitations were heard at one or other lung base in every case. At an early stage rhonchi were frequently present; in a few cases the crepitations could be heard over all areas of the chest. The changes in the lungs persisted almost as long as the raised B.S.R.; a spread to the opposite lung in Cases 25 and 29 (shown by clinical and X-ray examination) was associated with a further rise in the B.S.R. The length of time before the signs in the chest cleared up varied considerably, and it was not usually less than two weeks.

LABORATORY FINDINGS

These were limited to the simpler techniques. The white cell count was usually within normal limits; it was raised as would be expected in those producing a purulent sputum. It was raised quite inexplicably in Case 33. The mean white blood count for the series was 8,500 cells/c.mm. One of the most surprising findings was a complete absence of any eosinophilia. Not a single one of the 26 cases classified as severe (on account of X-ray changes) showed an absolute eosinophilia of more than 1,000 cells/c.mm. A type of lung condition associated with an eosinophilia is occasionally seen in a Gurkha, it is essentially different, in particular because it does not start as bronchitis. This eosinophilic lung condition is similar to that described by Weigarten (1943).

The hæmoglobin was found to be within the normal limits for young Gurkhas.

The B.S.R. was most strikingly raised. In almost a quarter of these cases it was over 80, a figure out of all proportion to the apparent severity of the condition. A reading of 60 was sometimes found in a patient who had had no pyrexia during his whole stay in hospital. The B.S.R. was used as an indication of recovery and a fall below 30 mm./hr. was required before discharge.

Routine stool examinations were carried out. A third of the patients showed infestation with *Ascaris lumbricoides*. The significance of this was extremely doubtful as there is a very high rate in the local Malayan population.

Sputum was examined in all cases for acid-fast bacilli. Direct smears and culture were carried out in a few cases only. In those patients who did not show a secondary infection, the sputum was very scanty.

X-RAY FINDINGS

The changes on X-ray were almost confined to the lung bases. The typical finding was a mottled appearance at one or both bases and this was well shown in the photograph of the X-ray of Case 13. Attempts to demonstrate a limitation to one or more basal segments by lateral views were unsuccessful. The appearance was most probably due to small areas of collapse.

A bronchogram on one of the severe cases (29) showed a very mild bronchiectasis. This was taken at the end of the acute attack and there was no reason to suppose that it was more than a temporary change.

TREATMENT

A routine Army expectorant mixture was used as a placebo. When the cough was particularly troublesome a codein or heroin linctus was used at night. No specific treatment was given a proper trial. Except where there was a secondary infection, penicillin and the sulphonamides appeared to have no effect.

COMMENTARY

The high incidence of bronchitis in Asian as opposed to European troops in Malaya is surprising. The particular frequency amongst Gurkhas led to the present investigation. This high incidence in Gurkhas seems to be due to a definite syndrome and an attempt has been made to describe this syndrome. The attack starts as a tracheitis and bronchitis. Clinically and radiologically there is then a spread to the bases of the lungs. The headache and high sedimentation rate are suggestive of a widespread disturbance. The other particular feature is the frequent absence of pyrexia; and in those in which a temperature occurs, after the day of admission the fever tends to be higher in the morning than evening.

The ætiology of this condition is unknown, it is likely that it is infective, but there was no opportunity to attempt to work out an epidemiology. The majority of cases occurred in recruits who had only recently arrived from Nepal. It was most unlikely that this was a primary tuberculous infection and a case seen after the end of this investigation had a well-marked calcified Ghon focus; also it would be surprising if every case cleared up as these were found to do. It was most unlikely that this was due to the migration of helminth larvæ since the presence or absence of ova in the stool bears no relation to the presence of the larvæ in the lungs.

This condition produces a serious loss of time to the recruits during their training. From the medical officer's point of view it is also important as a condition from which to differentiate the all too common tuberculosis. There is also a possibility that it is a precursor of bronchiectasis.

SUMMARY

(1) Bronchitis was found to be very common amongst Asiatic troops particularly Gurkhas.

(2) The findings in 26 of the more severe cases are described: the main features of these cases were:

(a) They started as a bronchitis.

(b) The frequent absence of temperature after the first day. When a temperature did occur it was common for it to be higher in the morning than the evening.

(c) A typical change at the bases of the lungs both clinically, and on X-ray.

(d) A high B.S.R., but no eosinophilia.

(3) The ætiology of the condition is unknown.

GURKHA BRONCHITIS

The case sheets on these patients have been divided into two groups.¹

(1) 26 severe cases with X-ray changes. Nos. 1, 4, 6, 10, 13, 14, 15, 18, 22, 23, 24, 25, 26, 27, 28, 29, 31, 32, 33, 34, 37, 38, 39, 40, 41, 42.

(2) 16 cases which were milder and showed no change on X-ray. Nos. 2, 3, 5, 7, 8, 9, 11, 12, 16, 17, 19, 20, 21, 30, 35, 36.

and also brief notes, and a photograph of an X-ray, from a similar condition in a Malay soldier.

Case 1.—N——, aged 17. One month's service in Malaya.

History.—He had a cough at the depot before leaving India.

Symptoms.—One week's cough. No pain in the chest.

Clinical Findings.—Moist crepitations were to be heard in all areas, but were most marked and most persistent in the left base. For the first two weeks the temperature was intermittently raised. On several occasions it was higher in the morning than in the evening by as much as two degrees Fahrenheit.

Investigations.—W.B.C. 12,200/c.mm. Hb. 100 per cent. Polys. 76 per cent, lymphos. 18 per cent, monos. 2 per cent, eosinos. 3 per cent, basos. 1 per cent. B.S.R. (8)² 95 mm. hr. (13) 97 mm./hr. (29) 55 mm./hr. (40) 22 mm./hr. Sputum: No A.F.B. Stool: *Trichuris trichiura* ova present.

X-ray: (13) Appearance at left base suggests bronchopneumonia. (26) Still shows some residual opacity.

Case 4.—H—— L——, aged 20. Nine months' service in Malaya.

History.—No previous illness.

Symptoms.—Pain over the sternum and trachea for four days, cough for fifteen days.

Clinical Findings.—Scattered crepitations and expiratory rhonchi at both bases. Crepitations persisted for one month. Temperature occasionally raised to 99°F. only.

Investigations.—W.B.C. 10,600/c.mm. Hb. 97 per cent. Polys. 75 per cent, lymphos. 20 per cent, eosinos. 1 per cent, monos. 4 per cent, basos. nil. B.S.R. (2) 40 mm. hr. (26) 18 mm. hr. (35) 16 mm. hr. Sputum: No A.F.B.

X-ray: (4) Mottling L. mid and lower zone. (17) Not much clearing in mottled appearance. (39) Lung fields now completely cleared.

Comment.—A case showing considerable change in the X-ray appearance of the lungs with no change in the temperature chart.

Case 10.—S——, aged 20. Ten months' service in Malaya.

History.—No past history of chest trouble.

Symptoms.—Three days' cough and fever, no pain in the chest.

Clinical Findings.—Marked moist crepitations, with slight consolidation at right base. Pyrexia for six evenings up to 102°F.

¹At the Author's suggestion, in order to reduce the space and costs required for publication and illustration, many of the case reports have been omitted and only a few illustrations used. In the original paper the cases and X-ray photographs are very interesting.—Ed.

²N.B. Figures in brackets e.g. (11) denote the number of days after admission that the test was performed.

Investigations.—W.B.C. 8,900. Hb. 92 per cent. Polys. 63 per cent, lymphos. 27 per cent, monos. 6 per cent, eosinos. 4 per cent, basos. nil. B.S.R. (11) 58 mm./hr. (16) 60 mm./hr. (32) 42 mm./hr. (44) 27 mm./hr. (55) 20 mm./hr. Stool: Ova of *Ascaris*. Sputum: No A.F.B.

X-ray: (6) Considerable mottling both bases. Right more than left. Radiologically it appears to be a bronchopneumonia. (37) Both lung fields now clear.

Comment.—This appears to be a case of bronchopneumonia; efforts to cultivate an organism were unsuccessful also the low white count is against a bacterial origin.

Case 13.—B——, aged 19. Two years' service in Malaya.

History.—Only mild coughs previously.

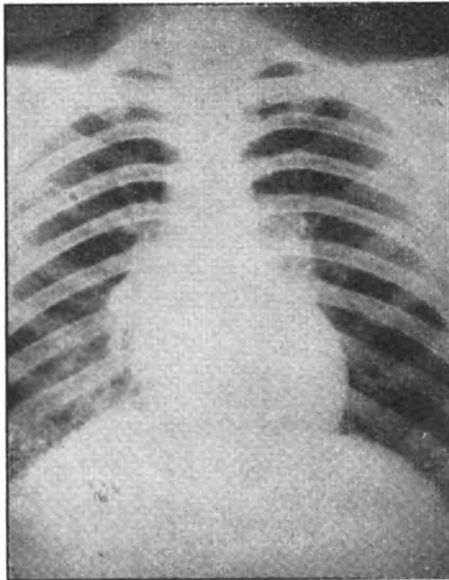
Symptoms.—Slight hæmoptysis on first day of cough. Two days' cough and pain over the front and upper part of the chest.

Clinical Findings.—Numerous fine moist crepitations at right base. Temperature rose to 104°F. on the third night after admission and then fell to become apyrexial on the sixth evening.

Investigations.—W.B.C. 6,400/c.mm. Hb. 90 per cent. Polys. 75 per cent, lymphos. 15 per cent, eosinos. 4 per cent, monos. 6 per cent, basos. nil. B.S.R. (1) 89 mm./hr. (5) 87 mm./hr. (13) 52 mm./hr. (20) 39 mm./hr. (32) 17 mm./hr. Stool: No ova. Sputum: No A.F.B. found.

X-ray: (7) Mottling at right base probably a bronchopneumonia. (28) Considerable resolution of mottling.

Comment.—A typical case.



X-ray of Case 13.

This X-ray shows the very typical mottled appearance at the right base. The W.B.C. was 6,400 cells/c.mm. and the B.S.R. 89 mm./hr. at the time when this film was taken.

Case 22.—B——, aged 18. Three weeks' service in Malaya.

History.—Occasionally he had had a cough with pain in the chest in the past in Nepal.

Symptoms.—Cough had been present for three weeks, also for the last three weeks he had had pain over the trachea which was worse on coughing.

Clinical Findings.—Crepitations were heard at both lung bases; they cleared up in about a week on rest in bed. The temperature was raised for the first twelve days. There was a tendency for the temperature to be raised higher in the morning than in the evening.

Investigations.—W.B.C. 6,300 cells/c.mm. Hb. 97 per cent. Polys. 55 per cent, lymphos. 40 per cent, monos. 0.5 per cent, eosinos. 3.5 per cent. B.S.R. (1) 82 mm./hr. (20) 40 mm./hr. (34) 50 mm./hr. (43) 22 mm./hr. Sputum: No A.F.B. found. Stool: Ova of *Trichuris*, *Ascaris* and *Ancylostoma duodenale*.

X-ray: (1) Lung fields show slight increase in opacity at the left base. (7) Radiologically further spread. (26) Some clearing at left base.

Comment.—A fairly severe case as shown by the six weeks it took for the B.S.R. to settle.

Case 23.—S—, aged 17. One week's service in Malaya.

History.—He had a previous attack of pain in the chest with fever in Nepal.

Symptoms.—Cough for two weeks, together with pain to either side of the sternum.

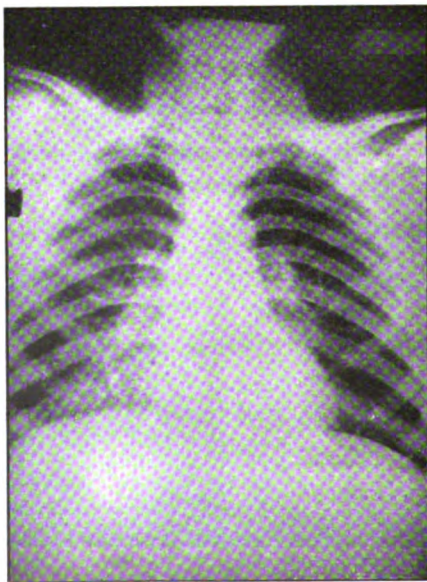
Clinical Findings.—Moist crepitations were heard at both bases for three weeks. Pyrexial for two evenings only.

Investigations.—W.B.C. 7,800. Hb. 98 per cent. No differential count performed. B.S.R. (2) 72 mm./hr. (16) 30 mm./hr. Stool: No ova seen. Sputum: No. A.F.B. seen.

X-ray: (2) Very slight mottling at left base. (22) Left base now clear.

Case 25.—T—, aged 17. One month's service in Malaya.

History.—No previous chest trouble.



X-ray of Case 25.

This is the second X-ray of this patient. The opacity at the rt. base has decreased slightly, there is the beginning of the spread to the left base which was slower in final resolution. The W.B.C. was 7,700 cells/c.mm. and the B.S.R. 106 mm./hr. The patient had been apyrexial for one week.

Symptoms.—Cough for thirteen days. No pain in the chest.

Clinical Findings.—Moist crepitations were present for three weeks in the chest; at first these were to be heard all over but eventually disappeared except for the bases. Temperature was raised for five days only. There was a slight tendency for the temperature to be higher in the morning than at night.

Investigations.—W.B.C. 7,700/c.mm. Hb. 89 per cent. Polys. 75 per cent, lymphos. 22 per cent, monos. 2 per cent, eosinos. 1 per cent, basos. nil. B.S.R. (2) 88 mm./hr. (10) 106 mm./hr. (21) 50 mm./hr. (34) 48 mm./hr. (42) 20 mm./hr. Stool: No ova seen. Sputum: No A.F.B. seen.

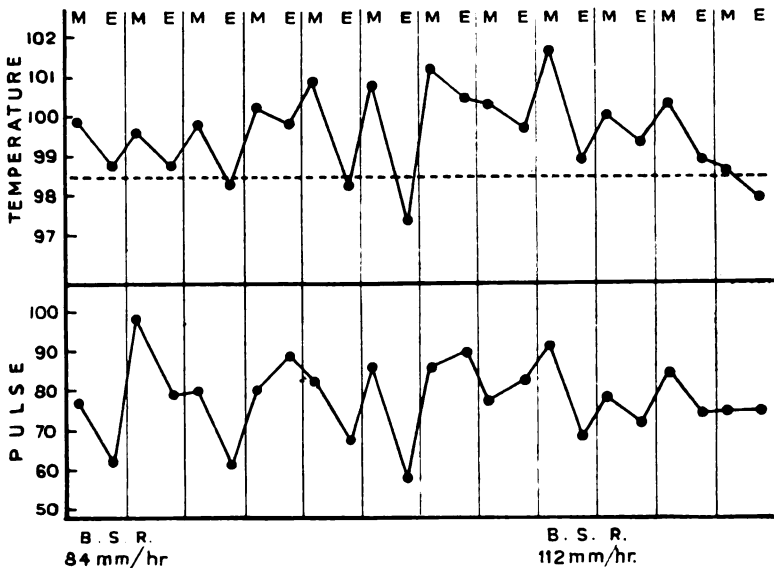
X-ray: (2) Appearance of a bronchopneumonia at right base. (10) Considerable clearing at right base; there is now a similar opacity at left base. (20) Residual mottling, left base more than right.

Case 29.—J—R—. One month's service in Malaya.

History.—No chest trouble in the past.

Symptoms.—Cough for two days, with pain over the sternum.

Clinical Findings.—Signs at both bases, right more than left. There was a decrease in breath sounds with crepitations, these signs lasted for about three weeks. This patient showed the morning rise in temperature particularly well, with a fall to normal in the morning for a whole week; after this his temperature settled completely (*see chart*).

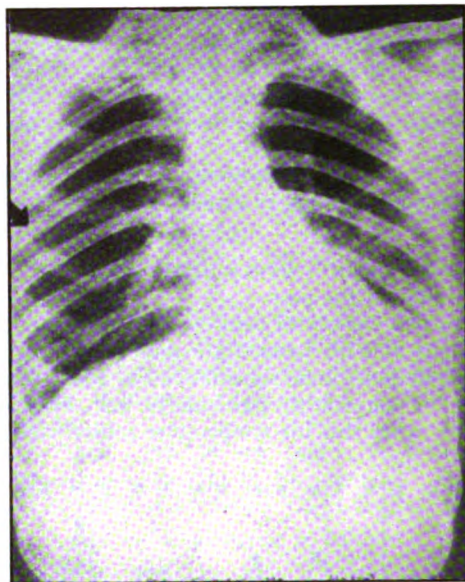


This chart shows particularly well the tendency for the temperature to be raised in the morning. A four-hourly chart shows that the highest temperature is usually at 10 a.m.

Investigations.—W.B.C. 9,100 cells/c.mm. Hb. 93 per cent. Polys. 68 per cent, lymphos. 20 per cent, eosinos. 4 per cent, basos. 2 per cent. B.S.R. (1) 84 mm./hr. (8) 112 mm./hr. (15) 102 mm./hr. (27) 85 mm./hr. (41) 18 mm./hr. Stool: Ova of *Trichuris trichiura*. Sputum: No A.F.B. seen.

X-ray: (1) Appearance of a left basal bronchopneumonia. (8) Spread to both bases. (17) Still considerable opacity left base, right base clearing. (35) **Bronchogram:** Very slight degree of cylindrical bronchiectasis on the left side affecting mainly the lower

branches of the left lingula, and also to a much less degree the basal bronchi of the left lower lobe.



X-ray of Case 29.

This film was taken a week after admission. There is a spread to the right base. The patient had been running a morning temperature for a week. The patient was not very ill. His B.S.R. had now risen to 112 mm./hr.

Case 33.—S——, aged 22. Three months' service in Malaya.

History.—He has had mild coughs in the past. He had one attack of fever with pain in the chest five months ago at the depot in India.

Symptoms.—A cough for seven days with pain over the lower sternum.

Clinical Findings.—This man looked miserable on admission with headache and pain in the chest. Loud moist crepitations persisted at both lung bases for two weeks. He ran no temperature for the whole period of three and a half weeks that he was in hospital.

Investigations.—W.B.C. (3) 22,000 cells/c.mm. (6) 12,800. (11) 4,900. Hb. 94 per cent. Polys. 83 per cent, lymphos. 10 per cent, eosinos. 5 per cent, monos. 2 per cent. B.S.R. (1) 70 mm./hr. (11) 52 mm./hr. (22) 30 mm./hr. Stool: Ova of *Ascaris* and *Trichuris*. Sputum: No A.F.B. seen.

X-ray: (1) Considerable mottling at both bases. (17) Still some change at both bases.

Comment.—Although he remained apyrexial this was a fairly severe case. It was the only case to show a raised W.B.C.

Case 39.—K—— B——, aged 18. Two months' service in Malaya.

History.—No pain or cough before.

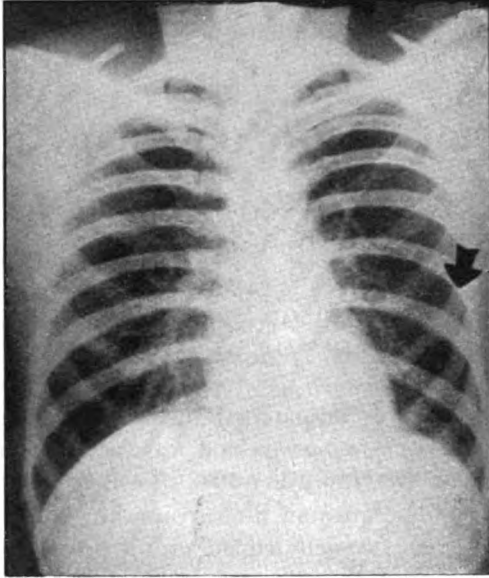
Symptoms.—He had had a cough for nine days. He had not had any pain in the chest.

Clinical Findings.—At first there were very few signs in the chest, other than a reduction of breath sounds at both bases. After about five days loud crepitations were heard, these persisted for about two weeks. The temperature was not raised during the four weeks that this man was in hospital.

Investigations.—W.B.C. 9,600 cells/c.mm. Hb. 102 per cent. Polys. 59 per cent, lymphos. 35 per cent, monos. 4 per cent, eosinos. 1 per cent, basos. 1 per cent. B.S.R. (2) 60 mm./hr. (11) 75 mm./hr. (22) 41 mm./hr. Stool: No ova or cysts found. Sputum: No A.F.B. found.

X-ray: (1) Mottling at both bases. (11) Lung fields now appear clear.

Comment.—Hospitalization did not prevent this patient becoming worse as judged by the signs in his chest and B.S.R.



A Similar Case in a Malay

Occasionally a similar condition appears in Malay troops. This man complained of pain over the sternum with headache and a cough. He had marked moist crepitations at the base of the left lung. His B.S.R. on admission was 75 mm./hr. His white count was within normal limits with no eosinophilia. The X-ray shows a mottling at the left lung base. This condition appears to run a shorter course in Malays.

This work was carried out while acting as a G.D.M.O. at the Military Hospital, Kluang. I wish to thank the O.C. Hospital and other members of the medical staff for their assistance, also the Consulting Physician for his encouragement. I am particularly indebted to Major Paul, the Command Radiologist, for his advice and permission to quote the reports on his X-rays: and acknowledge the permission of the Director-General, Army Medical Services, to publish this article.

Finally a word for the National Serviceman. He, unasked, finds himself working in ward or laboratory, but nevertheless he takes a keen interest, and is doing a fine job.

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THE HEALTH OF THE GUARDS BRIGADE IN MALAYA

BY

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THE Guards Brigade was despatched direct to Malaya from the United Kingdom in October 1948. A short period was spent in Singapore for training and acclimatization, but by November 1948, the Brigade was centred on Kuala Lumpur and units were operating in the surrounding country.

The movement of such a well-defined group provides an excellent opportunity for the study of their health record in Malaya in comparison with that of other British Army Units operating under similar conditions.

For the statistical survey the ancillary troops of the Brigade were not included and the Guards group consisted therefore of Battalions X, Y and Z. One battalion remained in Malaya for only nine months of the twelve under review, but due allowance has been made for this in the figures.

The Control Group consisted of three British Battalions A, B and C. They were not a homogeneous group. Battalion A had arrived in the Far East in October 1945, Battalion B had arrived in July 1947 from India, and Battalion C in October 1945. Few men of these units had served in the Far East throughout the period. The proportion of National Service men to Regulars varied somewhat during the period, but the average figure for the twelve months was as follows:

<i>Battalion</i>	<i>N.S.</i>	<i>Reg.</i>
X	0.22	1
Y	0.24	1
Z	0.55	1
A	0.89	1
B	0.58	1
C	0.27	1

The average age of the men of all the Battalions was 22.

Bulk figures for the remainder of the troops in Malaya District and Johore Sub-District over the same period are also available and although they are not strictly comparable with those for the Guards and Control Battalions owing to a somewhat different basis of compilation they are included in the table as a matter of interest.

The Guards Brigade was subjected to intensive health propaganda when they arrived in Malaya. Special mobile teams of hygiene instructors were organized to give comprehensive lectures and demonstrations during the period of training and acclimatization.

It was the experience of Army Health officers and of the Regimental Medical Officers of Guards Battalions that the Guards attended very strictly to health matters such as anti-malaria and anti-mite drill. They reported also that the Guards Battalions endeavoured to keep their water and sanitary duty personnel well up to establishment, and every medical recommendation or observation was given full consideration.

All the battalions of both groups were engaged in active service operations in the jungle. The environmental conditions were therefore broadly similar.

Table I gives rates per thousand strength for the units under review for the period November 1948 to October 1949 inclusive.

TABLE I.—ANNUAL RATES PER 1,000 STRENGTH FOR CERTAIN DISEASES AMONG SPECIFIED UNITS IN MALAYA, NOVEMBER 1948 TO OCTOBER 1949 INCLUSIVE

	<i>Guards</i>				<i>Control battalions</i>				<i>Remainder of Total</i>	
	<i>Total</i>	<i>"X"</i>	<i>"Y"</i>	<i>"Z"</i>	<i>Total</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>Malaya</i>	<i>Malaya</i>
Malaria	11.6	6.5	25.3	1.6	51.8	29.4	33.3	82.8	8.3	20.4
Dysentery/										
Diarrhoea ..	27.2	17.4	49.1	12.6	26.6	26.5	31.8	22.5	21.9	24.2
Skin conditions	63.1	110.3	53.8	37.9	47.7	22.1	57.1	59.6	135.1	97.3
Scrub Typhus ..	2.9	—	4.8	3.2	4.1	4.4	4.8	3.5	—	1.7
V.D.	61.3	39.0	66.5	72.7	200.9	91.2	177.8	296.6	51.4	92.5
Total of above	166.1	173.2	199.4	128.0	331.2	173.5	304.8	464.9	216.7	236.1
Other causes ..	329.9	363.5	375.0	260.3	388.5	286.8	625.4	289.9	308.1	333.6
Grand total	495.9	536.6	574.4	388.2	719.7	460.3	930.2	754.8	524.8	569.8

TOTAL ADMISSIONS

Taking the Guards as a whole the combined admission rate for the five main preventable diseases is exactly one-half of the corresponding figures for the Control Group. For other diseases the difference between the two groups is small.

MALARIA

The rate among all Guards was less than a quarter of the rate for the combined Control Battalions, the difference being undoubtedly statistically significant. We must, however, remember that the Guards were newly arrived

in Malaya, whereas the Control units had been there some time (one of them having previously been in India). It is therefore probable that cases of relapse among the Controls were more frequent than among the Guards and the disparity with respect to fresh infections alone would be smaller than the recorded figures indicate. It will be noted that the rate for the rest of the British troops in Malaya is actually lower than the rate for the Guards. This is because the majority of the others, being largely H.Q. staffs and ancillary troops, were living in town areas where the malaria risk was nil.

DYSENTERY AND DIARRHOEA

There is no difference between the Guards as a whole and the Controls.

SKIN CONDITIONS

Here the rate for the Guards is substantially higher than it is among the Control group but is less than half the rate among the residual troops. If, however, the figures are divided into two six-monthly periods we find that the Guards' rate in the first six months is a great deal higher than the Controls, whereas in the second six months the Guards' rate is actually lower than the Controls. This could be due to the fact that the Guards Brigade had only arrived in Malaya at the beginning of the period under review and it may have taken some time before they became as acutely skin conscious as units which had been in F.A.R.E.L.F. much longer and which were accordingly more fully aware of the importance of the precautionary measures in that Command.

SCRUB TYPHUS

In both groups there were too few cases for comment.

VENEREAL DISEASE

In this case the rate for the Guards was one-third of the rate for the combined Control Battalions. Here, too, a separation into the two half years is revealing. In the first half year the Guards' rate was one-fifth of the Control Group; in the second half it was two-fifths. This suggests the possibility that in the beginning when they had just arrived in Malaya the Guards were not yet familiar with the local set-up and being fresh from home were perhaps less inclined to take such opportunities as existed, but after they had settled in their restraint declined and their local contacts grew. However, even if this view is accepted it still remains true that although the Guards' rate increased in the second six months, their rate was still less than a half of that of the Control Group.

VARIATIONS BETWEEN BATTALIONS

The variations within the three Control Battalions are very great as Table II clearly shows.

Taking the Guards first we find that Z Battalion has the best record for each disease cited except V.D. where it has the worst. X Battalion, on the other

TABLE II.—COMPARATIVE RATES FOR CERTAIN DISEASES AMONG SPECIFIED UNITS
IN MALAYA, NOVEMBER 1948 TO OCTOBER 1949, INCLUSIVE
Standard : Total Guards = 100

	<i>Total</i>	<i>Guards</i>			<i>Total</i>	<i>Control battalions</i>			<i>Remainder of Malaya</i>	<i>Total Malaya</i>
		<i>"X"</i>	<i>"Y"</i>	<i>"Z"</i>		<i>A</i>	<i>B</i>	<i>C</i>		
Malaria ..	100	56	219	14	448	254	288	715	72	176
Dysentery/ Diarrhoea ..	100	64	180	46	98	97	117	83	80	89
Skin conditions	100	175	85	60	76	35	91	94	214	154
Scrub Typhus ..	100	—	164	109	143	153	165	119	—	58
V.D. ..	100	63	108	118	328	149	290	484	84	151
Diseases above taken together	100	104	120	77	199	104	184	280	130	142
Other causes ..	100	110	114	79	118	87	190	88	93	101
Grand total	100	108	116	78	145	93	188	152	106	115

hand, is let down by its incidence of skin conditions, whilst Y which statistically appears to be the worst Guards Battalions has a comparatively good skin record.

There are similar differences in the Control Battalions. Battalion A is quite good all round and its particularly low skin rate brings its total rate for the five diseases taken together to the same level as X and better than Y. On the other hand Battalion C, which has particularly heavy malaria and V.D. rates, has a relatively low incidence of dysentery/diarrhoea. It is incidentally interesting to note that by far the best V.D. record among the Control Group is held by Battalion A which is the one with a higher proportion of National Service men. This is in line with our experience in B.A.O.R. where the V.D. rate among National Service men is much lower than among other troops. Venereal disease tends to increase with length of overseas service and this is one cause of the disparity since National Service men serve overseas for only short periods.

CONCLUSION

The health of all the battalions has been good. The combined incidence of the five main preventable diseases in the Guards Group was 50 per cent of that of the Control Group. The disparity was most marked in the case of malaria and venereal disease. The incidence of skin disease was greater in the Guards group than in the Control group. This is related to the fact that the amount of skin disease appears to diminish as length of service abroad increases. It is due probably to acclimatization combined with increased knowledge and application of the requisite measures by the individual and by the group.

We are grateful to the Director General, Army Medical Services, for permission to publish this paper and to the D.M.S. Far East Land Forces, for statistical information supplied and collaboration in preparation.

THE NATIONAL TUBERCULIN SURVEY AND THE ARMY

BY

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*(Continued from page 156. September 1950)**

It is not proposed to report in detail on the results, as an analysis will no doubt form part of the official Medical Research Council report. A preliminary survey of the figures is, however, of interest.

Out of 5,130 who completed the test, 2,294 were positive at 1/10,000 and 1,121 positive at 1/100. There were 64 doubtfuls at 1/100 and 1,651 negatives. If these are expressed as a percentage the results are as follows:

<i>Positive</i>	<i>Positive</i>	<i>Doubtful</i>	<i>Negative</i>
1/10,000	1/100		
44.7%	21.9%	1.2%	32.2%

Five cases of active tuberculosis were diagnosed, 4 of them positive at 1/10,000 and 1 positive at 1/100. The radiologists also reported 13 cases of inactive tuberculosis (healed calcified) of which 3 were Mantoux negative.

In this respect it should be noted that of the two radiologists concerned one was responsible for nearly 90 per cent of the reports.

SUMMARY

The Army's contribution to the National Tuberculin Survey is described.

It is suggested that in doubtful reactions at a dilution of 1/10,000 Old Tuberculin, the second tests should employ a 1/1,000 and not 1/100 dilution.

A jump from 1/10,000 to 1/100 is otherwise quite safe.

A preliminary survey of the results gives a figure of 66.5 per cent positive reactions in National Service men.

I am indebted to Dr. A. E. Brown, who conducted the National Tuberculin Survey on behalf of the Medical Research Council, for his unfailing patience, forbearance and help in the organization of the Army's contribution to the work.

* Owing to a printer's error the concluding portion of this article was omitted. The error is regretted.—Ed.

Thanks are also due to all the medical officers in charge of the troops concerned and to Staff-Serjeant F. V. Roadway, R.A.M.C., of Southern Command Laboratory, who organized a steady supply of sterile materials.

Thanks are also due to the Director-General, Army Medical Services, for permission to publish this preliminary report.

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[A full report on the National Tuberculin Survey is under publication by the Medical Research Council.]

A CASE OF TROPICAL EOSINOPHILIA

BY

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Commanding a British Military Hospital, B.A.O.R.

The patient was a soldier, aged 35.

Foreign Service.—Ten years abroad (continuous service). Malaya, India (including two years in Bengal), and Burma. Returned to U.K. in June 1943.

He was admitted to Military Hospital, Copthorne, on March 19, 1945. For about eighteen months he had been complaining of:—

1. Productive cough with tenacious yellowish sputum of moderate amount—in August 1944 he coughed up a little blood for two days.
2. Shortness of breath on exertion.

He also complains of lack of energy, but no loss of weight. He has been hoarse for a month..

On Examination.—He is very hoarse, cyanosed and there are marked signs of chronic bronchitis and asthma in his lungs.

B.P. 98/64. Liver and spleen not palpable.

E.N.T. Report—"Subacute adenitis, chronic pharyngitis, bilateral cervical adenitis, chronic laryngitis. Injection of both cords and arytenoids. Injection of upper part of mucous membrane of upper part of trachea."

X-ray Chest.—Symmetrical bony thorax. Low placed flattened diaphragm. Early calcification of costal cartilages. Narrow cardiac shadow showing no enlargement of its chambers. Lung fields show a mild increase in pulmonary markings. No X-ray evidence of T.B. infiltration. No direct evidence of bronchiectasis.

B.S.R. 8/mm. in 1st hour.

W.R. negative.

Urine: No abnormal constituents. Stools: Nil of note.

Sputum: N.A.D.

R.B.C. 5,300,000/c.mm., Hb. 90 per cent, C.I. 0.88.

W.B.C. 20,800/c.mm., polys. 32 per cent, lymphos. 22 per cent, eosinophils 46 per cent.

The clinical picture presented by this patient who has lived for ten years abroad (Malaya, India (Bengal two years), and Burma. He returned to U.K. in June 1943. i.e. 21 to 22 months ago), i.e. chronic bronchitis and bronchial asthma with subacute rhinitis, chronic pharyngitis, chronic laryngitis, and chronic tracheitis, with *a very well-marked eosinophilia* in the peripheral blood is that found in so-called *tropical eosinophilia*.

This case presents also cervical adenitis and I have seen generalized, discrete, painless adenitis in other cases of tropical eosinophilia.

Treatment in this case consisted of carbarsone tabs i (grains 4), b.d. for fourteen days
Progress.

6.4.45: W.B.C. 22,400/c.mm., polys. 22 per cent, lymphos. 12 per cent, monos. 2 per cent, eosins. 64 per cent.

11.4.45: W.B.C. 21,900/c.mm., polys. 53 per cent, lymphos. 25 per cent, monos. 1 per cent, eosins. 21 per cent.

16.4.45: W.B.C. 18,400/c.mm., polys. 35 per cent, lymphos. 25 per cent, monos. 2 per cent, eosins. 38 per cent.

19.4.45: W.B.C. 14,000/c.mm., polys. 29 per cent, lymphos. 20 per cent, monos. 2 per cent, eosins. 48 per cent, basos. 1 per cent.

27.4.45: W.B.C. 12,000/c.mm., polys. 26 per cent, lymphos. 23 per cent, monos. 2 per cent, eosins. 49 per cent.

Tropical eosinophilia (*Weingarten's syndrome*/*Loeffler's syndrome*) has been described in East and West Africa, India, Ceylon, China, Havana, America, Samoa and other places. The symptoms include severe cough, expiratory dyspnoea like that of asthma, fever, loss of weight, pain in the chest, sometimes vomiting and diarrhoea and cutaneous manifestations (*erythema nodosum*, urticarial lesions and eruptions like papular tuberculides). Signs include splenomegaly in some cases and enlargement of lymph-glands, superficial and deep. There is an increase of the total white blood cell count with an obvious eosinophilia which may be as big as 80 per cent, as has been my experience in West Africans.

Radiological examination may reveal nil of note but may show diffuse mottling, usually symmetrical and most dense around the hila. Mites have been found in the sputa by some but these are not usually demonstrated and the cause is still obscure. The disease not infrequently relapses.

It is my opinion that a total white blood cell count, especially with a differential white blood cell count, is an investigation which is not demanded nearly often enough in febrile illnesses, where its value should be obvious and also in afebrile illnesses, where its help, though less obvious, is sometimes invaluable, e.g. in the disease under discussion, in the afebrile phase of infectious mononucleosis, in the afebrile anæmic patient who has chronic malaria, as well as in various disorders of the blood.

Furthermore all cases of so-called chronic bronchitis and asthma who are ex tropics should be exhaustively investigated for evidence of tropical eosinophilia and an adequate course of organic arsenic prescribed in all cases of doubt. Of course, in all cases of eosinophilia, all possible causes should be excluded before a diagnosis of Loeffler's syndrome is made at all and these, in my opinion, include amœbiasis (I have seen one case of hepatic amœbiasis with an eosinophilia of 20 per cent and which increased on emetine therapy but finally disappeared), hydatid disease (not forgetting the liver) as well as the usual intestinal parasites—cysticercosis and trichiniasis always being in the Service mind. Filariasis must not be forgotten. Also lymphadenoma, allergic diseases, neoplastic disease and drugs, etc., as possible causes must not be forgotten. One case I well remember with chronic bronchitis, severe asthma and a marked eosinophilia in the peripheral blood, invalided to the U.K. from India as a case of tropical eosinophilia, died and histological examination revealed periarteritis nodosa. This patient had frequent bouts of paroxysmal tachycardia during some of the severe paroxysms of asthma.

The treatment of tropical eosinophilia is believed to be successful, although relapses do occur and in some cases the response to treatment is very slow, and

consists in the exhibition of an adequate quantity of organic arsenic, either intravenously with ascorbic acid and Ca gluconate, or intramuscularly where N.A.B. would be used or orally when carbarsone gr. iv b.d. for fourteen days which was the treatment in this case, or stovarsol would be used.

It is said that during treatment the eosinophilia usually increases and falls within a fortnight or very slowly over a period of weeks, as the case presented would appear to have done. Weeks later I heard that the patient was much better.

I present this case for publication merely to emphasize the importance of asking every patient in which countries he has served; as all Service doctors do and in that way Loeffler's syndrome is immediately thought of in the asthmatic who has returned to the U.K. from tropical service. In the same way amœbiasis, kala-azar, cysticercosis and malaria, etc., are less likely to be missed.

ACKNOWLEDGMENTS

Major-General Sir Edward Phillips, *K.B.E., C.B., D.S.O., M.C., D.M.S.*
British Army of the Rhine, for permission to forward these notes for publication.

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THE BRITISH MILITARY MISSION, GREECE

A Report on the Work of The R.A.M.C. Branch B.M.M.(G)

IN the early days of the Mission the most urgent task of the Medical Branch was the building up of a Field Medical organization in the Greek Army. Field Ambulances were formed and trained on the British model, and forward Military Hospitals instituted in the towns and villages in the widely scattered areas of operations.

Owing to lack of manpower it was never possible to have more than one Field Ambulance to a Division instead of the three which are allotted to a British Division. Arduous and exhausting indeed was the work of these stretcher bearers in bringing their comrades from the front line to a spot where surgical aid could be given. Often the liberated local peasants, men and women too, helped in this heavy task which entailed carrying the wounded up and down the most precipitous mountain tracks often for many hours at a time.

Perhaps the most dramatic improvement effected in the forward treatment of the wounded was the introduction of Field Surgical Units on the British model. These small units each with a skilled surgeon and anæsthetist and with British equipment were pushed forward as near as possible to the fighting line. It is impossible to assess how many lives and limbs have been saved by the formation of these units and the skill and devotion of their personnel.

At the same time reorganization of the base hospitals was undertaken. A vast increase of hospital beds was necessary; schools and other suitable buildings were taken over and equipped (largely with American help), till some 6,000 Hospital beds were in operation.

The proper nursing of the wounded presented almost insuperable difficulties. Greece in general is woefully short of trained nurses. There were in the Army only five trained nurses. A number, quite inadequate, of civilian nurses ill spared from civilian needs were brought into military hospitals but the greatest part of the nursing of the wounded soldier devolved on untrained volunteers and ward maids. To provide an adequate nursing service for the Greek Army steps were taken to form "Queen Frederika's Royal Army Nursing Corps" on the model of our Q.A.R.A.N.C., and a school for Army nurses was formed with the active help of the Hellenic Red Cross. A British Nursing Sister of the

Q.A.R.A.N.C. was installed as Supervisor to the School and training carried out on the lines of the British system.

The School has now been operating for three years and some sixty cadets have been under training of which 25 3rd year students have now qualified. Unfortunately, owing to delay in the passage of the law for the formation of the "Queen Frederika's Royal Nursing Corps," they have not yet been commissioned into the new corps but it is hoped this will take place very shortly and its good effects are bound to be far reaching.

In due course the Medical Services of the Greek Army were placed on a sound basis and in the large scale operations of 1948 and 1949 the wounded soldier was assured of early surgery, rapid and efficient evacuation in which air transport played its part, and adequate treatment at the base hospitals. The effect on the morale of the Greek soldier was great. Hitherto he had always had the feeling that if he was wounded on the mountain tops, his chance of survival would be slim.

Emphasis now shifted to the question of the rehabilitation of the wounded and maimed. The word "rehabilitation" covers two aspects—the restoration to normal or as near normal function as possible of the injured body, and the reconditioning of the permanently injured man to fit him into civil life in a new trade. Even in England "rehabilitation" is a comparatively new word but our vast experience derived from two world wars has led us to realize the vital necessity for such work and to develop its technique to a high degree.

As a result of the bandit war there are many soldiers suffering from terrible injuries of bones and joints and with paralysis due to that dastardly weapon the "SCHU mine."

At the instigation of the B.M.M. and under the auspices of the British Council and British Medical Association, an eminent orthopædic surgeon paid a visit in March 1949 to give advice and help on the question of orthopædic surgery and the after-treatment of disabled men. Largely at his instigation and with the active co-operation of H.M. The Queen of the Hellenes, who donated a sum of 3 billion drachmæ for the purpose, a Rehabilitation Centre of 300 beds with a well-equipped physiotherapy department and ample rehabilitation apparatus has been formed.

The Centre was opened in October and though its formation represented a great step forward it was realized that much yet remained to be done. In consequence a further visit by the Surgeon was arranged for November 1949. As a result of his recommendations it is now hoped to extend the work of Rehabilitation by the formation of a Rehabilitation Service, with a subsidiary Centre, operating at first under the Ministry of War but destined eventually to become a National Service under a Civilian Ministry to cater for both military and civilian needs.

Linked up with the question of Rehabilitation has been the problem of the supply of artificial limbs. The services of a technical expert from our own great centre at Roehampton have, by the courtesy of the British Ministry of

Pensions, been acquired for help and advice in the reorganization of the Greek artificial limb factories in order to improve the standard of the articles made and to increase production. This gentleman paid a short visit in March 1949 at the request of the Mission and is now on a more prolonged visit of some three months working in conjunction with the Greek Recovery Programme Co-ordination Office, and there is no doubt that his services will be of immense help towards solving the urgent problem of supplying to the sufferers of the bandit wars, who have deserved so well of their country, the limbs and appliances which will enable them to take their part again in the national life.

HELLENIC INTERLUDE

A Review of the Medical Aspects of the B.M.M. to Greece, 1945-1950

BY

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Royal Army Medical Corps

D.D.M.S. British Military Mission Greece

IN order to form a picture of the work of the Medical Branch of the B.M.M. to Greece, it is necessary to have some knowledge of the historical background of the country.

Greece has been at war continuously for the last ten years. It was in the winter of 1940 that the Greek Army commanded by F. M. Papagos heavily defeated the invading Italian Forces and threw them into Albania: then came the German invasion. British Land and Air Forces ill-spared from our slender resources in the Middle East were thrown in in an unavailing attempt to stem the tide.

On the capitulation of the Greek Army a small part of it managed to escape to the Middle East where the famous Rimini Brigade was formed which operated alongside the 8th Army.

When the British Forces entered Greece in 1944 in the wake of the retreating Germans they found a country exhausted and bleeding from many wounds, with its economy disrupted and suffering from grievous lack of food, clothes and the essentials of life. There was no army except the Brigades referred to above which had been fighting in the Middle East. Many of the cream of the population, potential future leaders, had perished in the resistance movement. Practically the whole of Greece was in the hands of Communists and within a few weeks of the liberation civil war broke out. The handful of British troops in Athens at that critical time saved the situation and prevented a communist triumph. The communist rebellion was broken in December 1944, and thereafter for some eighteen months an uneasy peace broken by spasmodic "incidents" reigned, during which the communists made their "build up" underground. In 1947 the communists started open revolt afresh and for three years Greece was to suffer again widespread desolation and misery.

Many thousands of valuable lives have been lost in the struggle and tens of thousands of unfortunates made homeless; nor is this the worst, for thousands of families mourn children seized from them by the bandits to be brought up behind the Iron Curtain to hate their parents and their country.

The British Military Mission was formed in March 1945 and it was its task

to advise and assist the Greek General Staff in the building up of the National Army from its tiny nucleus, and to arrange for the provision of equipment and supplies from the U.K. Before the war there had been a French Military Mission in Greece and the Army had been organized on the French system: now the British system was to be introduced.

BUILD UP OF THE MEDICAL SERVICES

The first task was the provision of a field medical organization to cover the formations that were in the process of being raised.

Field Ambulances were formed and trained on the British model, some as Mountain Field Ambulances, some as Light Field Ambulances. Experimentation, trial and error resulted in many changes in the type of Field Ambulance and the W.E. for it. Eventually it was based on the standard British Field Ambulance. The fundamental difficulty lay in the fact that the Greek General Staff could not allot (owing to lack of manpower) more than one Field Ambulance per Division. The Field Ambulance could thus fulfil only an evacuating rôle and was inadequate even for that. The latest organization of the Field Ambulance consists of ten Sections. A Headquarter Section and nine others for attachment to each of the nine battalions of the Division. The organization is not finalized and is dependent on the eventual decision on the ORBAT of a Division, i.e. whether one, two or three Field Ambulances will be included.

Field Surgical Units.

These were raised and trained and proved to be invaluable. Eventually it proved to be the F.S.U.s round which the A.D.s.M.S. of Divisions formed their tactical plans and the siting of these units was always a matter for serious consideration.

Field Hygiene Sections.

These units were raised and trained in a similar manner to the original British Units. Eventually they were replaced by Sanitary Sections and Sanitary Inspectors, as being too expensive in manpower, with the exception of four which remained as L. of C. and base troops.

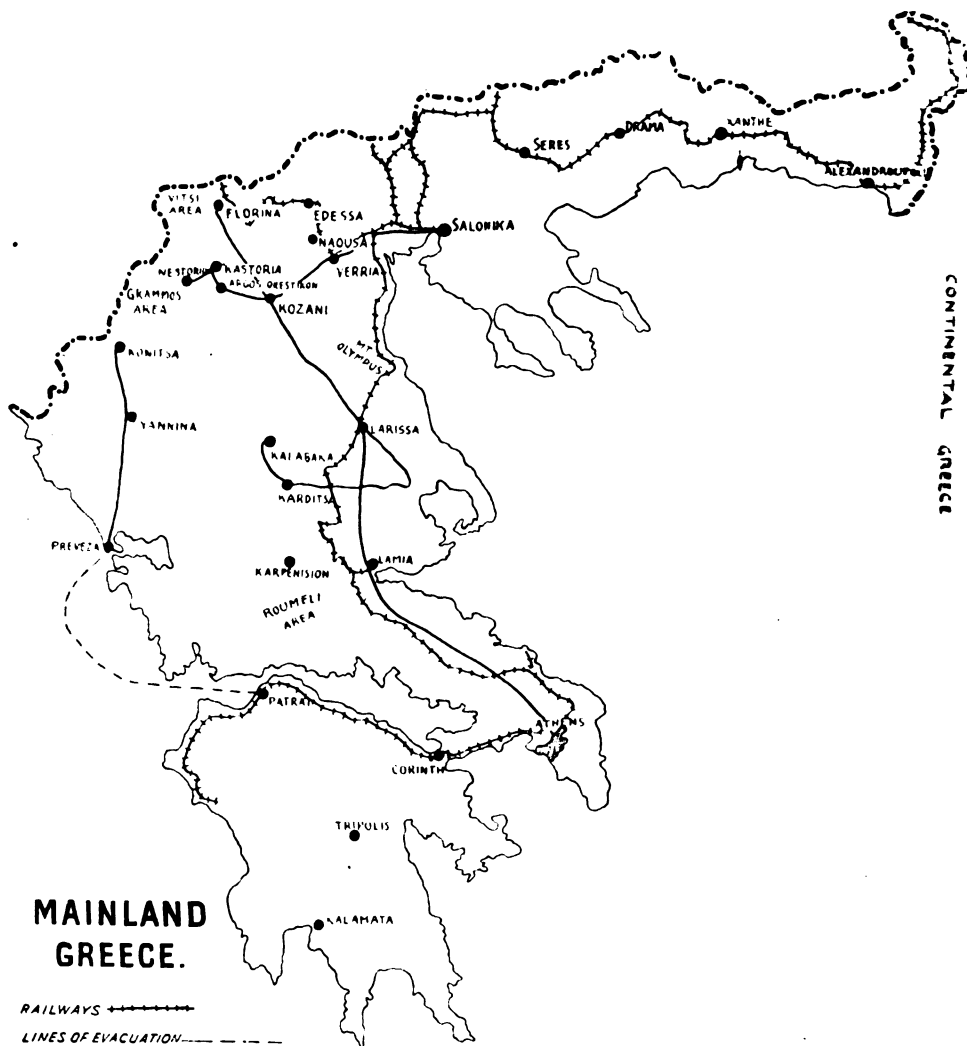
Training Centres.

A Medical Corps Depot and Training Establishment was sited originally in Athens and eventually moved to Patras. Its first O.C. and 2 i/c were officers who had had the advantage of undergoing a course of instruction at our own Depot at Crookham. Recruits were given a six-week training course there after leaving their Basic Training Centres. Newly joined M.O.s also underwent classes at the Medical Training Centres.

School for Nurses.

A Training centre for nurses was set up in Athens in one of the Military Hospitals with a view to the formation of an Army Nursing Corps. This had

the full-time service of a British Nursing Officer of the Q.A.R.A.N.C. as adviser and tutor.



School of Hygiene.

This was formed in Athens and courses in Malariology as well as in General Hygiene were given to Medical and non-medical personnel.

At the same time a build up of hospital accommodation was instituted.

Forward Hospitals.

Local civil hospitals or wings of such hospitals or schools were taken over in the provincial towns, and these were the first link between Field Ambulances and the Base Hospitals. In fact two of such hospitals were later equipped with

C.C.S. equipment and designated C.C.S.s and acted as such in the major operations which will be considered later, though they were completely static.

Base Hospitals.

In Larissa, Salonika and Athens a gradual build up of beds was put in motion involving the taking over of schools, University buildings and municipal hospitals.

It is not to be supposed that these units came into being without many difficulties and without long delays. It was not until 1948 that a satisfactory build up of hospital beds had been achieved or that the Field Medical Units were completed.

In July 1946 the British Army was fast carrying out its post-war demobilization and the Greek Army took over responsibility for Internal Security. It was as yet not ready and the bandits took the opportunity to increase their authority and multiply their activities. Serious reverses led to disorganization and demoralization. Political pressure as a result of the popular outcry for protection was brought to bear on the Army which resulted in the infantry being scattered in small pockets over the countryside with no real mobility and with little control by Brigades and Divisions.

OPERATIONS, 1947-1949

When in 1947 the Greek Army undertook its first major operations against the bandits, Medical units in common with the remainder of the Army were to a considerable extent in a state of unpreparedness. Many of the Medical Units shown on the ORBAT did not in point of fact exist and others existed only in cadre form. Transport vehicles were everywhere deficient. Some types of units such as Field Hygiene Sections and Malaria Control Units though complete with equipment had only a fraction of their personnel, others were well up to strength but lacked equipment.

The operations carried out in 1947 were not successful in breaking bandit resistance. The main stronghold of the bandits lay among the mountain mass of Mt. Grammos and Vitsi where the country is almost unbelievably wild and broken. Steep mountain peaks rise to 7,000 or 8,000 ft. covered with trees and undergrowth to within a thousand feet of their tops. Dividing them are deep precipitous ravines. The area has a frontage in Greece of some 140 miles and backs on the states of Albania and Yugoslavia. In these countries lay the bandit bases and a constant stream of supplies and reinforcements was in being from these "friendly" countries.

The enemy were not slow to add to the natural defences with strong pill-boxes, dugouts, etc., so that it is not surprising that the as yet untried G.N.A. failed to dislodge them. Though it was here that the main strength of the enemy lay, throughout the whole mainland of Greece and the Peloponese large bandit forces were in action necessitating the tying up of troops all over the country.

Before passing on to the story of 1948, reference must be made to a very important change which had taken place in the rôle of the Mission.

Britain's own economy was suffering from the shock of the post-war blizzard and early in 1947 the British Government which hitherto had provided equipment and supplies for the rebuilding of the Greek Army found it obliged to announce that it would be unable to continue Greek aid beyond March 31, 1947. Fortunately the United States decided to step in and prevent the collapse which the withdrawal of British aid threatened. As a result of President Truman's declaration American equipment and medical supplies now replaced the British. Since, however, the Greek Army was committed to British organization and training, the British Mission remained in this rôle while the supply side was taken over by the Americans.

The change over to American equipment and medical supplies naturally created difficulties, but with the active co-operation of the American Supply Officers these were gradually overcome.

Reverting once more to the story of the operations—1948 was a year of high promise. Many lessons had been learned and morale was high and it was hoped that that year would see the end of the bandit menace.

The year started well with successes in the Olympus area. In March operation "Dawn" was mounted with a view to surrounding and liquidating some 2,500 bandits in the Roumeli area north of the Gulf of Corinth. This operation was very largely successful also but not completely so, as owing to a break in the weather, a portion of the bandits was enabled to escape to the north. Further smaller operations were carried out throughout central Greece and in the Peloponese, and the main operation "Crown" was launched on June 19 against the Grammos area. The operation was successful in that the position was taken, but the main body of the bandits was able to step over the Albanian boundary and during the winter months the bandit leader Markos and his troops were able to infiltrate again over the border and once again turn Grammos and Vitsi into a hostile fortress.

1949 opened very inauspiciously. Two fairly large towns, Naoussa and Karpenision, were attacked by bandit forces, sacked and destroyed, and their inhabitants murdered or kidnapped. Revolting crimes were committed and many hundreds of children were the victims of these savageries.

However, in spite of these setbacks which caused a temporary serious depression in morale, a new spirit had arisen in the G.N.A. since the appointment of F. M. (then General) Papagos as C. in C. in January 1949, and the planning which had taken place during the winter was soon to be put to the test.

First a series of successful operations cleared the Peloponese. In the meantime the Roumeli area was the scene of large-scale operations which ended again in incomplete success as, though the area was cleared, a fair proportion of bandits were able to escape. Gradually during the early part of the year the

greater part of Central Greece and Macedonia was cleared leaving the hard nut of Vitsi and Grammos yet to be cracked.

The medical arrangements for these various operations had been fraught with great difficulty—the nature of the country—wild and roadless, the large areas covered by operations necessitating very long and often arduous carries imposed great strains on the Medical Services.

It is to be remembered that only one Field Ambulance was available per Division so that very frequently indeed the local peasant population, where available, were called on to help in the carriage of wounded. This they did, men and women too, very worthily. The medical plan was basically very similar in all cases and depended primarily on the siting of the F.S.U.s; thence the wounded were evacuated to a hospital in the adjacent town which had formed the base of the operations and thence by road, or sometimes by sea or even by air to the bases of Larissa, Salonika and Athens.

During the summer of 1949 plans were worked out and final preparations made for the assault on Vitsi and Grammos.

At this time the G.N.A. was disposed in three Army Corps—"A" Corps on the left with a responsibility for the southern and western part of Continental Greece. "B" Corps in the centre responsible for the northern and eastern part of Continental Greece, and "C" Corps on the right responsible for Macedonia. With each of these Corps was a British Liaison Unit which included on its establishment a D.A.D.M.S.

Unfortunately, owing to the shortage of Medical Officers, two of these appointments were vacant, one officer acted for both "A" and "B" corps, "C" Corps being left without one.

Since Vitsi and Grammos lay in the areas of "A" and "B" Corps respectively, it was on these two Corps that the responsibility for the campaign devolved. A brief account of these final battles in the clearing of Greece may not be out of place.

DISPOSITION OF G.N.A. FORMATIONS

On August 1 G.N.A. formations were as follows (*see sketch map*):

"B" Corps—Headquarters Kastoria

2 Division based on Florina in the North East.

11 Division south of 2 Division.

10 Division and 3 (Commando) Division in the south based on Kastoria.

9 Division in South East.

"A" Corps—Headquarters Argos Orestikon

1 Division facing west, based on Nestorion.

8 Division facing north, based on Konitsa.

Army Reserve

15 Division south of Argos Orestikon.

11 Infantry Brigade south of Argos Orestikon.

Cover Plan.

The plan of campaign adopted by the Greek General Staff was to attack and clear the Vitsi area first and then deal with Grammos.

In order to mislead the enemy into thinking that Grammos would be the first objective of the G.G.S. and so prevent his reinforcing Vitsi from Grammos, an attack was launched by "A" Corps on the Grammos front on August 2 with limited objectives.

1 Division captured Tsarno but was subsequently driven off,

8 Division launched a limited offensive north of Konitsa which had partial success.

The operations lasted till August 7. Casualties were fairly heavy, 1 Division receiving some 400 casualties and 8 Division some 80.

Though the operations failed in their tactical objectives, the strategic effect was obtained and Vitsi was not reinforced.

VITSI OPERATIONS

On August 10 Operation "Torch," the attack on the Vitsi stronghold by "B" Corps started at 10.30 hours.

2 Division from the east made substantial advances capturing strategic points. At 20.00 hours the same day, 3 (Commando) Division followed by 10 Division attacked northwards from the south. At the same time one Commando Brigade followed by 11 Division advancing east passed through 2 Division and captured Tsouka.

The advance continued during the 11th and 12th, and on 12th Lessits was captured after hard fighting.

In the meantime 9 Division whose rôle was to advance northwards along the border and cut the escape routes of the enemy into Albania had started but its advance was slow, partly due to shelling from within Albania.

The successes in the north and centre however resulted in the overrunning of the whole Vitsi area and on August 15 bandit resistance collapsed.

GRAMMOS OPERATIONS

Immediately after the victory at Vitsi the G.N.A. was regrouped as follows: "A" Corps was allotted the rôle of attack in Grammos with the following formations:

9 Division in the north facing west and south.

1 Division based on Nestorion, facing west.

3 Commando Division in support of 1 Division.

15 Division south of 1 Division and facing west opposite Tsouma.

77 Infantry Brigade south of 15 Division
8 Division facing north, based on Konitsa } in a holding role.

"B" Corps containing Vitsi area with 2 Division and 10 Division.

The attack started on 25th with 9 Division pushing west along the Albanian frontier. 1 Division attacked in the Tsarno-Papouli area and made the opening for 3 (Commando) Division to pass through.

In the centre 15 Division attacked the Tsouma Grammos ridge. Here enemy resistance was stiffest and progress was comparatively slow.

The main feature of the operation was the rapid advance of 9 Division which turned south down the Albanian border. This success was exploited by the transference of a Brigade from 15 Division to 9 Division and resulted in the capture of Grammos and Koukouli. Enemy resistance was broken by the night of August 28.

MEDICAL ARRANGEMENTS

Routes of Evacuation.

(a) The line of evacuation for all these formations exclusive of 8 Division was through Kozani. Thence:

- (i) by road to Salonika.
- (ii) by road to Verroia and by ambulance rail coach to Salonika.
- (iii) by air to Athens, Salonika or Larissa.

8 Division casualties were evacuated through Konitsa to Joannina (Yannina) and thence by road to Preveza and ship to Patras or by air to Athens or Larissa.

In addition there was direct air evacuation from Argos Orestikon (Kastoria), Florina and Joannina to Athens, Salonika or Larissa.

(i) Evacuation from Forward Areas.

Evacuation from the firing line took the normal form of hand carriage by Unit or Field Ambulance stretcher bearers or by mule carriage.

The G.N.A. have only one Field Ambulance with each Division. In the immensely difficult terrain in which the operations took place, the number of stretcher bearers available is quite inadequate. In order to provide help A.Ds.M.S. Divisions were empowered to obtain the services of local civilians and these numbered from 40 to 100 in the different Divisions according to circumstances. One civilian was killed and one wounded while employed as stretcher bearers.

Wherever possible ambulance cars or jeeps were used as far forward as possible in order to shorten the carry.

In spite of the really terrible nature of the terrain, the vast majority of casualties reached F.S.U.s within six hours, though for some, owing to the fall of night and the difficulties and dangers inherent in evacuating over country not yet consolidated, the time was considerably longer.

Having reached the F.S.U.s the severe cases were taken in for operation and the lighter casualties evacuated further to the C.C.S.s. In order to relieve the congestion at F.S.U.s in many cases A.Ds.M.S. Divisions organized posts in front of F.S.U.s where lightly wounded could be diverted from the F.S.U.s direct to C.C.S.s.

Post operative cases were retained in F.S.U.s till fit for evacuation, generally some forty-eight hours, but chests and bellies and very severe wounds of the trunk or limbs which had been severely shocked were kept for seven to ten days. At Nestorion where two very busy F.S.U.s were sited, accommodation was limited, the number of gravely wounded caused on occasions grave anxiety and extra tented accommodation, equipped with beds, mattresses, sheets and pillows

instead of stretchers which had been the original "reserve" beds were eventually installed. In the event they proved unnecessary.

(ii) *Evacuation from C.C.S. and Field Hospitals.*

It was apparent from the disposition of the forces that 202 C.C.S. Kastoria would be the hub of the operations from the medical point of view since wounded from all the Divisions of "B" Corps excluding 2 Division and parts of 11 Division would drain into Kastoria. The C.C.S. was sited in a small hospital building and did not readily admit of expansion. By the use of tents and annexes, bed accommodation up to 400 was provided. This was not really sufficient and it necessitated the closest watch on evacuation and the maximum use of evacuation facilities.

Evacuation of the more lightly wounded by convoy to Kozani amounted to 200 each morning during the days of stress and on occasions a supplementary evacuation of some 80-100 had to be arranged in the afternoon.

(iii) *Air Evacuations.*

In addition use was made of air evacuation for the more serious cases fit to travel. There was some initial delay in getting evacuation going, but urgent representations as to the vital necessity for keeping forward hospitals cleared, eventuated in two Dakotas arriving at Argos Orestikon for evacuation from Kastoria on the 13th and two at Florina on the same day.

Thereafter two planes a day arrived at Argos Orestikon for the remainder of the Vitsi operations.

For the Grammos operations three planes daily were allotted specifically for medical evacuation with a further call on four more in the event of necessity. These proved unnecessary and not more than two a day were required from Argos Orestikon (Kastoria).

(b) *Use of F.S.U.s:* — F.S.U.s were whenever possible deployed in pairs. In order to effect this it was necessary on occasions to switch units temporarily from Divisions less heavily engaged. This policy has much to recommend it. It enables the operating staff to obtain some rest and sleep. There is no doubt the work deteriorates when surgeons attempt to carry on for twenty-four or forty-eight hours without rest.

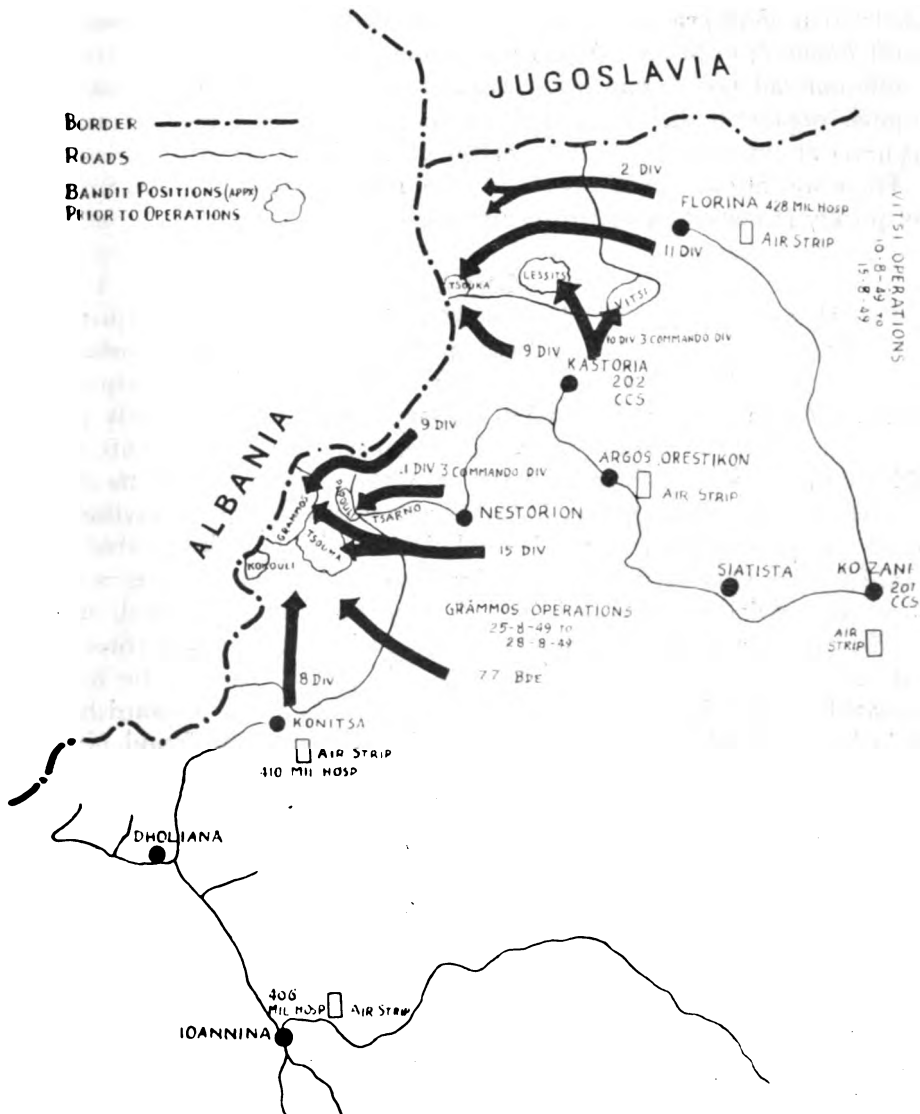
As the advance continued in some Divisions, one of the pair was pushed farther forward and further "leap-frog" advances were contemplated. The collapse of enemy resistance precluded the necessity for these moves.

The F.S.U.s proved of immense value and were undoubtedly instrumental in saving a great many lives. The standard of surgery in all these units (and in the forward hospitals) was very high indeed. The mortality rate of those operated on was under one per cent—a notable figure when one considers that the Greek soldier's toughness enables a higher proportion of wounded men to reach the F.S.U.s alive than, I venture to think, would be the case in other armies. It is a tribute both to the surgeons and nursing staffs and to the heroic stoicism and powers of endurance of the Greek soldiers.

(c) *Forward Hospitals.* The following expansions to forward hospitals were carried out in preparation for the operations:

Florina	428 Military Hospital	from 100 to 300 beds
Konitsa	410 Military Hospital	from 100 to 200 beds
Joannina	406 Military Hospital	from 300 to 430 beds
Kastoria	202 C.C.S.	from 200 to 400 beds
Kozani	201 C.C.S.	from 200 to 500 beds

The actual Vitsi operations started on August 10 but during the previous week 202 C.C.S. Kastoria had received some 400 wounded as a result of the "cover plan" operations of 2 Division.



During the four days 11th to 14th, 202 C.C.S. Kastoria received over 800 casualties; during the period 10th and 13th, 428 Military Hospital Florina received some 500.

Although the surgical potential at 202 C.C.S. had been increased to 3 surgical teams, it became evident that the strain on these was too great and a further complete team was flown from Salonika on August 14.

In addition civilian aid was called in. For the Grammos operations five surgeons were in operation at 202 C.C.S. and they were fully employed.

From 25th to 29th some 1,200 wounded were received in 202 C.C.S. Of these nearly 600 were received in the first twenty-four hours and only intensive organization of all evacuation facilities prevented a serious breakdown.

(d) *Blood Transfusion*.—Blood was available as required from Athens and in addition "ad hoc" Transfusion Teams were formed. F.S.U.s and forward hospitals organized their own blood banks from the civil population. There was never at any time or place a shortage of blood.

There was at one period a scarcity of glucose saline at 202 C.C.S., but this was quickly remedied on signalling Athens.

COMMENT

Though the present ORBAT of the Medical Service proved adequate to the severe trial it underwent during those operations, it is to be remembered that the G.N.A. was fighting in its own country—there was civilian help available for the carriage of wounded, static military hospitals were already in being close to the front and the local population, particularly boy scouts and girl guides, gave invaluable help at these hospitals. There can be no question, however, that the medical cover for a Division is inadequate for anything but a bandit war. With only one field ambulance it is quite impossible for the A.D.M.S. of a Division to conserve divisional manpower. There is nowhere to keep the trivial wounded and sick. A man who is unfit to march and carry his rifle is a drag on his unit and even though he requires only three or four days to put him right he must leave his unit. This being so, he had to be evacuated. It was impossible to keep him at the C.C.S.s of forward hospitals. the beds were needed for serious cases and in the event he found himself in the stream of evacuation cluttering up the L. of C. and landing up eventually in Athens or Salonika. There is very real need for an increase in the medical cover for a Division either by increasing to three field ambulances or by the addition of an F.D.S.

POST-WAR DEVELOPMENTS

The victories of Vitsi and Grammos proved decisive. The defection of Yugoslavia was a serious blow to bandit plans and the bandit war was called off.

The post-war period has been occupied with the gradual reduction of the Greek Army accompanied by intensive formation training. This reduction has of course been reflected in the reduction of hospital beds and the handing back of requisitioned buildings used as war-time hospitals for their original purposes.

The Greek Medical Services are now facing similar problems to those which confronted our own after the cessation of hostilities. Many of the Reservist Officers are being released from service and among them a large number of specialists.

The regular cadre of officers have had no opportunity for specialist study and overseas training during the past ten years, hence there is a grave shortage of specialist officers of all types. The training of specialist officers is perhaps the most vital requirement at the moment for the Greek Army Medical Service.

Mention has been made of the institution of an Army School of Nurses. Greece is woefully short of trained nurses. There were in the Army only five trained nurses of the Regular Service. A number, quite inadequate, of civilian nurses ill spared from civilian needs were brought into military hospitals but a great part of the nursing of the wounded soldiers devolved on what are known as "practical" nurses who are quite without scientific training, and are untrained volunteers.

To provide an adequate service for the Greek Army steps were taken to form "Queen Frederika's Royal Army Nursing Corps" on the model of the Q.A.R.A.N.C. and a school for training cadets for this Corps was formed with the active help of the Hellenic Red Cross.

A British Nursing Officer of the Q.A.R.A.N.C. was installed as Supervisor to the school and training is carried on, on the lines of the British system. The curriculum is of three years and the diploma is recognized by the Greek Nursing Council. The cadets on qualifying are to become commissioned officers. The status of the professional nurse is not high in Greece. In order to ensure due recognition of their standing insistence was made on their receiving commissioned rank. It is hoped thereby not only to attract the best types and to form a Corps which will uphold the dignity of the profession, but also to encourage the raising of the status of the professional nurse throughout Greece. The school has now been operating for three years and some sixty cadets have been under training, of which twenty third-year students have now qualified.

Unfortunately owing to a delay in the passage of the law for the formation of the "Queen Frederika's Royal Army Nursing Corps" they have not yet been commissioned into the new Corps, but it is hoped that this will take place shortly.

With the ending of hostilities the emphasis has shifted to the question of the rehabilitation of the wounded and maimed.

It had long been realized that the need for rehabilitation was a crying one. Rehabilitation was almost unknown in Greece. At the instigation of the B.M.M. and under the auspices of the British Council and British Medical Association, Mr. St. John Buxton, F.R.C.S., paid a visit to Greece in March 1949 to give advice and help on the question of orthopædic surgery and the after treatment of the disabled.

As a result of these years of war there are many soldiers suffering from

terrible injuries of bones and joints, many paraplegics and many thousands of amputees, victims of the "Schu" mine. Supported by the strong recommendations of Mr. Buxton, with the active co-operation of H.M. the Queen of the Hellenes who donated a sum of three billion drachmæ for the purpose, and with the generous assistance of the Public Health Department of E.C.A. it has been possible to form a Rehabilitation Centre of 300 beds with a well equipped physiotherapy department and ample rehabilitation equipment.

The Centre was opened in October and though its formation represented a great step forward it was realized that much yet remained to be done. In consequence a further visit by Mr. Buxton was arranged for November 1949. As a result of his recommendations it is now hoped to extend the work of Rehabilitation by the formation of a Rehabilitation Service, with a subsidiary Centre at Salonika, operating at first under the Ministry of War, but destined eventually to become a National Service under a civilian Ministry to cater for both military and civilian needs.

Physiotherapists are very scarce nor is there in Greece any recognized school of physiotherapy. Measures are in hand to establish under Government auspices a recognized school of physiotherapy, the training staff of which will be partly American and partly British.

Linked up with the question of Rehabilitation has been the problem of the supply of artificial limbs. The services of a technical expert from our own great centre at Roehampton have, by the courtesy of the British Ministry of Pensions, been acquired for help and advice in the reorganization of the Greek artificial Limb factories in order to improve the standard of the articles made and to increase production.

This gentleman paid a short visit in March 1949 at the request of the Mission and a more prolonged visit of some three months at the end of 1949 and during the early months of 1950, working in conjunction with the Greek Recovery Programme Co-ordination Office, and there is no doubt that his services will be of immense help towards solving the urgent problem of supplying to the sufferers of the bandit wars the limbs and appliances which will enable them to take their part again in the national life.

If I may be allowed to end on a personal note, two things stand out as unforgettable memories of my Greek tour. The first is the stoicism, courage and endurance of the Greek wounded soldier. His toughness of fibre, his cheerful endurance of pain and his obstinate refusal to give up the fight for life were undoubtedly contributing factors in the remarkably low mortality rate among the wounded.

Of the second matter I would say this. In an appointment of this nature which of its essence involves the constant collaboration with officers of a foreign army, there are bound to be times when differences of opinion may arise, when the national angles of approach differ and when the minor misunderstandings and irritations imposed by dealing through interpreters, a procedure which precludes the subtler nuances of meaning, tend to induce a rise in temperature.

It is a tribute which I pay gratefully to the charm and unfailing courtesy of the Greek Officers and officials with whom I have had to deal that these things have never obscured the sense of real liking and friendship which has at all times pervaded my relationship with them.

I am indebted to Colonel J. M. Mackenzie, *C.B.E., M.C.* (for whose efforts on its behalf during two years the Greek Medical Service owes a very large debt of gratitude), for his kindness in supplying me with certain material for this article.

MOSQUITO CONTROL IN THE BRITISH SECTOR OF BERLIN—SUMMER 1949¹

BY

Major F. G. NEILD

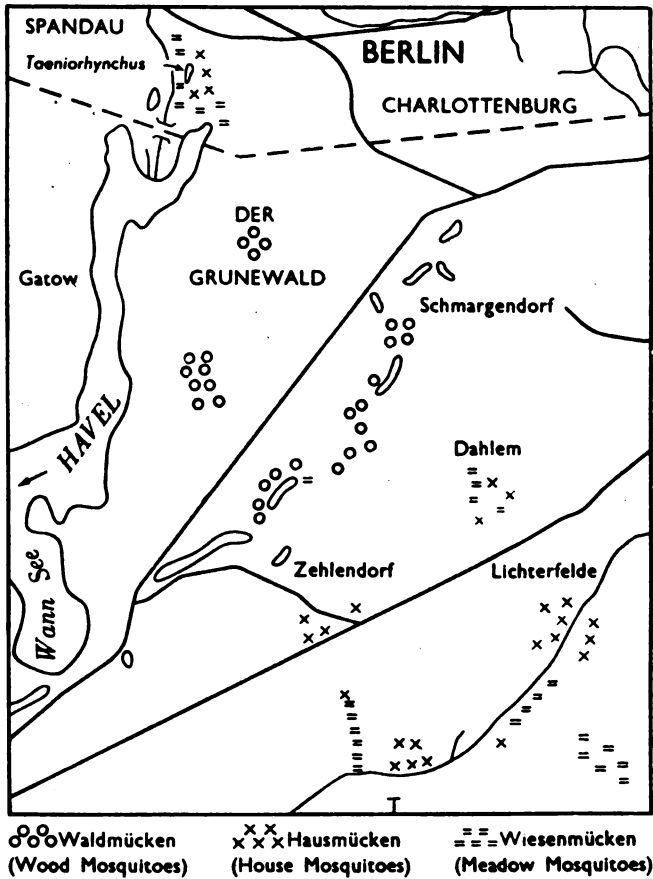
Royal Army Medical Corps

BERLIN is a city surrounded by a network of lakes and inland waterways. It has two great rivers, the Spree and the Havel, from which branch off large lakes, Müggel See, Tegeler See, Wannsee together with a host of smaller ones. It has three large canal systems together with their docks, the Hohenzollern, Landwehr and Teltow. It has many large forests, the Grunewald being the best known, and parks such as the Tiergarten, while on its outskirts it is surrounded by an almost complete ring of irrigation fields. This combination of water and shade had always made Berlin a favourable breeding ground for mosquitoes which in the past have had a considerable nuisance value.

However, since the war, this nuisance has become a problem—this is as the result of the large increase in stagnant water due to the vast amount of debris and rubble lying about; of the cutting up of the parks into small allotments (the Tiergarten which was once a wooded park, is now only an allotment area) and of the blocking of the waterways by fallen masonry and demolished bridges. For instance, it was reported in the *Telegraf Am Abend* of October 20, 1949, that to enable the Landwehr Canal to be opened, about 2,500 cubic metres of dirt in the American Sector and about 18,000 cubic metres in the British Sector had to be removed from the canal in order to have the normal depth of two metres for navigation.

In order to mitigate this nuisance, up to 1947 mosquito-nets were available for all British personnel, and D.D.T. residual spraying of all Military Missions, including the C-in-C's Mission to the Soviet Forces of Occupation at Potsdam, large offices, clubs, cookhouses and ration stores was carried out by the Field Sanitary Section. This programme was repeated in 1948 except that mosquito-nets were not used. With the publishing of a General Routine Order making modified stirrup pumps available for issue on a scale of one for every 35 men and more frequent spraying with D.D.T. residual spray possible, a wider campaign was planned for 1949.

¹Maps have been provided by the Author.



(1) MOSQUITO SPECIES OF BERLIN

In 1929 was published by Dr. F. Peus of the Prussian National Institute for Water, Soil and Air Hygiene, Zoological Division, Berlin-Dahlem, in the *Zeitschrift für Desinfektion* the following article *Die Stechmückenfauna des südwestlichen Gebietes von Gross-Berlin*. In this survey he recognized four main groups which were located as shown in sketch one. These groups were:

(i) The Wood mosquitoes

Aedes rusticus
Aedes maculatus (= *cantans*)
Aedes meigenanus
Aedes communis (= *nemorosus*)
Aedes cinereus

(ii) The Meadow mosquitoes

Aedes vexans
Aedes dorsalis
Anopheles maculipennis
Anopheles bifurcatus

(iii) *Taeniorhynchus* (= *Mansonia*) *richiordii*

(iv) The House mosquitoes

*Culex pipiens**Culex picalis**Culex hortensis**Theobaldia annulata**Anopheles maculipennis*

In 1937 was published by the same Dr. F. Peus in the October number of the *Zeitschrift für Hygienische Zoologie und Schädlingsbekämpfung* the following article *Ermittlungen über die Stechmücken-Fauna von Potsdam als Grundlage für die Stechmücken-Bekämpfung*. In this survey he found in the woods around Potsdam *Aedes caspius*, *Aedes maculatus* (= *cantans*), *Aedes annulipes*, *Aedes excrucians*, *Aedes flavescens* (= *lutescens*), *Aedes salinellus*, *Aedes punctor*, *Aedes cinereus*, *Aedes vexans*. While he found the following house mosquitoes, *Culex pipiens*, *Theobaldia annulata* and *Anopheles maculipennis* in the Nuthe meadows in the neighbourhood of the Horst Bridge, in the Bornstedter See and in the Friedensteich (pond) by the Friedenskirche.

During the summer of 1949 the following areas were surveyed with results as shown:

Havel, south of Frey Bridge.

The Havel itself on both sides appeared quite free from larvæ except at one place, Schwanen Island, where *Culex pipiens* and *Culex hortensis* were found in great numbers. Many culicine exuvæ were found floating in various parts of the Havel, but there were no signs of larvæ.

In the area of Scharfe Lanke *Aedes flavans* and *Aedes vexans* were found breeding in ponds and water butts in private gardens. In Pichelsdorf larvæ of *Aedes flavescens* were found and in the irrigation fields of Karolinenhöhe many of *Anopheles maculipennis*.

The Glienicker See area was most infested, the swampy ground yielding many Culicine larvæ and those of *Anopheles maculipennis*, while the marshes amongst the woods in the area of Montgomery Barracks bred *Aedes vexans*, the fiercest Berlin biter, in considerable numbers.

Havel, north of Frey Bridge.

The fields on the right bank of the Harvel, north of the Frey Bridge, bred *Anopheles maculipennis* on a large scale and *Anopheles bifurcatus* sparsely, until the network of canals at Tiefwerder was reached where many *Culex imagines* and *Aedes larvæ* were found.

The rest of the Havel yielded little except that there was a heavy concentration of mosquitoes and Chironomidæ in the woods around the Zitadelle. West of the latter, thickly and widely distributed amongst private allotments and millstreams, were found larvæ of *Anopheles maculipennis*, *Culex hortensis* and *Aedes flavescens*.

Ruhleben Marshes.

Scattered specimens of *Culex pipiens*, *Theobaldia annulata* and *Chironomidæ* were found as well as imagines of *Aedes flavescens*, *Aedes vexans*, *Aedes annulipes* and *Aedes cinereus*.

Grunewald.

Many Culicine and *Aedes* larvæ were found.

Tiergarten Bezirk.

Widely scattered larvæ of *Anopheles maculipennis* and *Anopheles bifurcatus* as well as many *Culex* ones were found. Imagines of *Theobaldia annulata* were found in the allotments of the Tiergarten park.

On the other hand the canals and harbours yielded very little.

(2) INCIDENCE OF MALARIA IN GREATER BERLIN

The Robert-Koch-Institute, Berlin-Dahlem, report that following World War I there was a small rise in malaria which soon died away. Following World War II there has been a large rise in malaria, almost entirely benign tertian, due to the number of carriers from Russian sources, German P.s of W. and D.P.s, and possibly the increased density of the malaria vector (*Anopheles maculipennis*). It has also been reported that a number of outbreaks of malaria have occurred in the East Zone, the carriers being Russian troops from the Crimea. These Berlin cases have occurred in four main areas (i) Köpenick, (ii) north of the Frey Bridge, (iii) Schloss garden in Charlottenburg and (iv) Tiergarten itself. No cases have been reported amongst British personnel. Prior to 1935 malaria was not recorded by the Robert-Koch Institute.

Year	Total cases of malaria	Fresh cases	Relapses	Deaths
1935	Nil	—	—	—
1936	Nil	—	—	—
1937	Nil	—	—	—
1938	Nil	—	—	—
1939	6	—	—	1
1940	4	—	—	—
1941	14	—	—	—
1942	47	—	—	—
1943	56	—	—	1
1944	136	—	—	1
1945	153	—	—	3
1946	1,089	—	—	7
1947	577	402	175	2
1948	572	230	342	—
1949*	73	27	46	—

*Western Sectors only.

(3) ANTI-MOSQUITO MEASURES

Following the directions of G.O.C. British Troops Berlin that wider anti-mosquito measures to neutralize this nuisance should be carried out this year.

BERLIN AND SURROUNDING COUNTRYSIDE



1. Tiergarten 2. Tegeler See 3. Zitadelle 4. Müggel See 5. Hohenzollern Canal
 6. Ruhleben 7. Tiefwerder 8. Scharfe Lanke 9. Schwanen Insel 10. Pichelsdorf
 11. Karolinenhöhe 12. Schlossgarten in Charlottenburg 13. Montgomery Barracks 14. Potsdam

in conjunction with Public Health, Military Government, early in March, the following measures were suggested:

- (i) Liaison with Allies,
- (ii) Action by German Population.
- (iii) Action by British Population.

(i) *Liaison with Allies.*

(a) *Russian.*—As they were not represented on the Tripartite Health Committee, no information was forthcoming.

(b) *French.*—They did not appear to be as worried by mosquitoes in their Sector and did not consider that anti-mosquito measures in N.W. Europe were necessary.

(c) *American.*—They confined themselves to domestic spraying and in June airsprayed the canals in their Sector, the small lakes in the Grunewald and the Pichelsdorf area. They were due to have sprayed again in August but owing to the coolness of the summer and the little breeding that had taken place, they did not. They sprayed with a C.47 aircraft (Dakota) which flew between 100 and 200 feet at 150 m.p.h. The aircraft held 400-gallon containers and the fluid came out of a pipe and formed a spray immediately.

(ii) *Action by German Population.*

It was originally planned with the Landesgesundheitsamt that the campaign should be conducted on (a) "Domestic" basis, (b) Municipal basis and (c) Treatment of the canals and larger waterways. But the L.G.A. estimated that it would cost DM 150,000 to carry out this campaign, so that it had to be dropped and only (a) was attempted. This was done by republishing a Police Ordinance which required householders to keep their premises clear of stagnant water and encouraged them to purchase insecticides at chemists. This ordinance conflicted to some extent with another exhortation to citizens of Berlin to grow more vegetables locally.

As the Magistrat had no money to spend on larval control, it was suggested that larval control might be practised on the canals by fluctuating the water levels, a method used in the T.V.A. project in U.S.A. Unfortunately it was not possible to try this method as the Soviet Military Authority were in control of the Inland Waterways of Berlin in respect of all technical matters.

(iii) *Action by British Population.*

A British Troops Berlin Routine Order was published for the Army and Control Commission while similar action was taken by the R.A.F. These measures under three heads were (a) Personal, (b) Unit and (c) Hygiene Wing.

(a) *Personal.*—It was recommended that all ranks from sundown to dawn should wear trousers and shirts or jackets with sleeves down to the wrist. For personnel working at nights, units would draw repellents for 10 per cent of the strength of the unit at a scale of two ozs. per man per month. For a unit such as Forward Air Supply Organization 100 per cent was authorized.

(b) *Unit.*—Units were responsible for anti-mosquito measures in their own areas, married and single quarters, messes, locations where they were finding

guards and where practicable, for anti-laval measures, within a perimeter of half a mile outside their area.

These anti-mosquito measures took two forms, anti-laval and destruction of adult mosquitoes. Anti-larval measures consisted in removal of all collections of water and where this was not possible in weekly oiling with a mixture of sump oil. (Sump oil was recommended as being already available and so not requiring space on the airlift.) Destruction of adult mosquitoes was done by forming unit spray teams who sprayed all buildings at an interval of six weeks on four occasions during the summer. They drew five gallons of residual spray D.D.T. per 100 men each time from the Hygiene Wing attached to the British Military Hospital (cf. "The Use of D.D.T. in the Field, 1945," Chap. 4, para c).

(c) *Hygiene Wing*.—They mixed all the residual spray (D.D.T.) and were responsible for the spraying of Allied Missions, large office blocks, flats, clubs and buildings not included in any unit scheme as well as for any necessary outside ceiling. To carry this programme out they had two spray teams, each having two "Four Oaks" Sprayers, who worked full time throughout the summer. In addition, they carried out oiling of certain areas north of the Frey Bridge.

The Control Commission were responsible for their own arrangements, but a Sanitary Assistant was lent to assist them in supervising their spray teams. One particularly swampy area in the Grunewald was left alone at the request of the Germans as (i) it was the spawning ground for some valuable fish and (ii) the site of a botanical garden of rare plants.

(4) SUMMARY

These measures, as far as the British population were concerned and admittedly in a mild Berlin summer, were most successful except in the Gatow and Kladow areas. Here the boundary between the British Sector and the Russian Zone runs along woods and the Glienicke See, so that measures could not be taken. It was therefore authorized that married personnel living on the edge of these woods could draw mosquito-nets if they so desired. It was considered that every six weeks was about the optimum time to spray because Military Missions, who did not conform to the programme, usually rang up at that interval of time to be done again.

However, as the Spree and its associated canals between leaving and re-entering the Russian Zone pass through all four Sectors, mosquito control in Berlin is a long term objective which will only be solved by the cooperation of German authorities both in and outside the city, by the clearance of rubble and the freeing of all waterways.

I should like to thank Colonel J. M. Ryan, A.D.M.S. British Troops Berlin, for permission to forward this paper and Brigadier D. G. Cheyne, C.B.E.

(Retd.), Principal Health Officer H.Q. Mil. Gov. Berlin, for information from the Allied and German Public Health Authorities.

S/Sjt. W. Milton, R.A.M.C., was in charge of all outside spraying and oiling while Cpl. W. Culican, R.A.M.C., did the species survey. These specimens were identified by courtesy of Professor Dr. H. Kemper of Dept. VIII of the Robert-Koch-Institute, Berlin-Dahlem, who also kindly supplied all the figures on the incidence of malaria.

APPROACH TO PNEUMONIA

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Royal Army Medical Corps

Officer-in-Charge Medical Division of a Military Hospital

IN the Services almost all cases of pneumonia, and indeed most cases of upper respiratory tract infection, certainly those occurring in unmarried other ranks, are treated in hospital or M.R.S. As a result the Service physician, with all diagnostic aids at hand or reasonably available, is provided with a golden opportunity of diagnosing, in so far as modern diagnosis lends itself, differentiating and treating the different types of pneumonia the presence of which, it must be admitted, is not infrequently initially indicated by the radiologist when a routine skiagram of the chest has been requested just to exclude involvement of the lung parenchyma. It is safe to say that numerous cases of pneumonia are so mild that in civil life, at least, many of these cases pass unnoticed; the individual scarcely taking to his bed and treated as a "severe cold" or influenza which has "held on" and "dragged the patient down a bit."

The frequent use of skiagrams of the chest these days—a practice scorned by the not-so-old physicians of 10 to 15 years ago—has revealed a greater incidence of pneumonia than would have been diagnosed otherwise. I say this in all humility and without the slightest disrespect to our greatly revered teachers who taught that the main use of skiagrams of the chest was to confirm the physical signs elicited on clinical examination. I believe that it is as commendable to elicit obvious physical signs as it is to walk through Hamburg, which is said to have been 70 per cent destroyed by bombing, and say that a large part of Hamburg is in ruins.

Stress should be laid on the recognition of early, and therefore minimal, signs of disease and not, as is frequently the case, on the obvious visible, palpable or radiological signs which are unmistakable.

What is pneumonia? It is defined simply as "Inflammation of the lungs." Pneumonitis is defined similarly while acute lobar pneumonia is defined as "Inflammation of one or more lobes of the lung." It is unfortunate that pneumonia to many would appear to mean an acute disease of the lung parenchyma which either responds to sulphonamide/penicillin or it does not. If it does not respond to such treatment and the total white blood count is below 10,000 to 12,000 c.mm. then it is frequently regarded as a "virus" pneumonia. Such a diagnosis is frequently made with a knowing look and there the

matter ends. This approach to pneumonia is common and not just amongst recent graduates. No determined search is made for the ætiological agent no matter the response to empirical therapy. Nature is allowed to take its course and so cases of enteric group fever, typhus fever, primary atypical pneumonia, "Q" fever, canicola fever, Weil's disease, influenza, psittacosis, etc., are recorded as "Virus" pneumonia or sulphonamide/penicillin resistant pneumonia when streptomycin might have effected a rapid response to therapy in leptospirosis; or aureomycin in various other diseases characterized by pneumonia.

Care must be taken to avoid overlooking pulmonary tuberculosis in cases regarded as primary atypical pneumonia or as "Virus" pneumonia. A Mantoux test is of value in some cases. The sputum or gastric washings should also be searched for acid and alcohol fast bacilli which should be identified on culture and animal inoculation. In some such cases repeated skiagrams of the chest at judicious intervals, T.P.R., weight and E.S.R. records, as well as tomogram, may be indicated. Furthermore, unresolved pneumonia should always be regarded as possibly due to cancer and in every case in the forties it should be regarded as such until the contrary is proved. In addition, bronchiectasis should not be forgotten in repeated attacks of pneumonia. Cancer should also be excluded in all cases of lung abscess in which it is believed to be present in one-third of cases over the age of 45 years.

It is a pity that the approach to cases of pneumonia is so narrow as regards investigation and differentiation of types. On making a remark to that effect I am amazed at the frequency of the reply "why worry about the cause as long as the condition clears up with or without empirical therapy and the patient gets better?" This attitude is more frequent than it should be. It is to be deprecated and discouraged. It shows lack of the enquiring mind. Pneumonic signs may vary from fine crepitations—the "Pneumonitis" of some—to the full-blown classical signs of consolidation which include bronchophony and tubular breathing. These signs should merely mean involvement of the lung parenchyma and be regarded as a rough guide to the morbid processes taking place. Such signs should be tantamount to a demand for a thorough clinical, radiological and laboratory investigation. Pneumonia may be due to superadded infection in cases of typhus fever, etc., but I have seen cases where only the pneumonic signs attracted attention and capable physicians diagnosed typhus fever as lobar pneumonia. For typhus fever may be read enteric group fever, M.T. malaria, relapsing fever, hepatic amœbiasis, pulmonary neoplasm, "Q" fever, leptospirosis, etc. etc. (*see* official Nomenclature of Diseases, Seventh Edition, 1948).

At this point I should like to make a plea that the term "Primary Atypical Pneumonia" should be discarded. In 80 per cent of cases of this disease it is said that cold agglutinins are present in the blood. What is typical pneumonia? What is atypical pneumonia? What is primary atypical pneumonia? A monstrous abortion, I should say.

The usual routine in cases of pneumonia in hospital is as follows. T.R.P.

are taken on admission, and in addition to the routine clinical examination the following investigations are carried out:

- (a) Total and differential white blood cell count.
- (b) Sputum, where present, is tested for a predominant organism which is tested for sulphonamide penicillin sensitivity.
- (c) Initial radiological examination of the chest is carried out as soon as practicable or indicated. Later in convalescence clearance skiagrams of the chest are always carried out.

Sulphonamides with or without penicillin are normally exhibited empirically as they must be at this stage. If the patient is found to be suffering from a recognized bacterial pneumonia which is sulphonamide/penicillin sensitive and responds in the anticipated manner, no more investigations are carried out, provided the patient makes an uninterrupted recovery. Of course in the Tropics or in any malarial district, and that may be South East England, blood films and thick drops are examined in every case for evidence of malarial parasites. If the patient is still considered to be suffering from a bacterial pneumonia and does not appear to be responding to treatment, then we consider:

- (1) that the organism may be sulphonamide/penicillin resistant, as the laboratory test should confirm,
- (2) a recognized complication has arisen, e.g. pleurisy with or without effusion, empyema, lung abscess, pericarditis, etc.
- (3) some other disease process is present, and in the Tropics among the numerous diseases that leap readily to mind are two in particular—arch enemies of all physicians and surgeons—namely malaria and hepatic amœbiasis.

When the sputum shows no predominant organism and pyrexia persists a palpable spleen and the appearance of a rash would call for blood culture, if this has not already been carried out and repeated, and the institution of serological reactions, e.g. Weil Felix reaction, Widal reaction in those not protected by T.A.B., etc. etc. Although in all vague cases we carry out serological tests to exclude primary atypical pneumonia, ("Q") fever, infective mononucleosis, leptospirosis, influenza and possibly psittacosis in the appropriate case. A point well worth remembering is that the Weil Felix reaction may not become positive until well into the convalescence in a case of typhus fever. The serological reactions in other diseases, including canicola fever and Weil's disease, can behave in similar manner. It must not be forgotten that by no means all cases of typhus fever develop a rash, and so any case with pneumonia and splenomegaly must be investigated as a possible case of septicæmia, subacute bacterial endocarditis, typhus fever, malaria, etc. etc.

It will be seen therefore that all relevant investigations are carried out in all cases with pneumonic signs in the chest until the ætiological agent is demonstrated, or the type demonstrated serologically, or by a process of exclusion, e.g. the virus group of indeterminate origin.

Clinical and Other Notes

CHOLELITHIASIS AND PARAPLEGIA IN GUINEA-PIGS

BY

Lieutenant REGINALD A. HOLMAN, M.B., Ch.B.

Royal Army Medical Corps

DURING the maintenance of apparently healthy male guinea-pigs in the animal house of my laboratory it was observed that two of the adult pigs developed unusual symptoms; symptoms which necessitated their being put to death.

As these conditions had not appeared before during the past three years' experience with these experimental animals it was thought worth while to record them.

Case 1.—An uninoculated pig had to be killed after a short illness lasting approximately forty-eight hours. The first thing noticed was loss of appetite and little or no inclination to drink water. The fæces passed were well formed but of a pale green colour as opposed to the normal dark brown appearance. The pig was obviously lethargic, sitting in the corner of the cage and disinclined to move.

About forty hours after the onset it was apparent that the animal was in pain, lying on its back, kicking its legs and rolling its head and body from side to side. This continued at increasingly frequent intervals when it was decided to relieve it of its agony with chloroform.

Findings at Autopsy.—There was nothing abnormal to be seen apart from the biliary tract. The two main bile ducts from the lobes of the liver were patent and contained a small amount of dark green bile. About half-an-inch from their junction there was a solitary stone, completely occluding the lumen of the common bile duct. This stone was ellipsoidal, 4 by 2 mm. in size and was dark green in colour. The wall of the duct was thinned and stretched around it. No other stones were found. The gall-bladder presented a much shrunken and hypertrophied wall, with polypoidal projections on its peritoneal surface. There were no calculi in its interior.

On analysis of the stone oxalates and bile pigments were demonstrated but no cholesterol.

This animal would appear to have had a chronic cholecystitis with solitary stone formation which resulted in biliary colic.

Case 2.—An uninoculated guinea-pig was noticed to be dragging its hind legs loosely behind it and to be incontinent of urine and fæces. Both limbs were the seat of flaccid paralysis.

This persisted for two days and as there seemed to be no sign of improvement of the condition it was decided to kill the animal.

Findings at Autopsy.—After exposing the contents of the abdominal cavity and removing the viscera it was observed that a small swelling existed anterior to the upper lumbar vertebræ. Whilst dissecting the muscles and fascia from the swelling a globule

of yellow pus appeared. On incising the swelling an abscess was revealed, extra-dural in character and compressing the spinal cord.

The only other pathological findings were multiple small pyogenic foci in the upper lobes of both lungs. The left upper lobe was firmly adherent to the parietal pleura and two other ribs were involved in the inflammation.

Bacteriological examination of the pus revealed pneumococci.

This would appear to have been a case of bilateral bronchopneumonia with an associated extra-dural abscess producing the paraplegia.

I wish to thank Lieut.-Colonel M. W. S. Bisdee, O.C., Connaught Hospital, for his permission to publish these observations.

A CASE OF SUBMAXILLARY CELLULITIS INVOLVING TRACHEOTOMY

BY

Captain E. S. FOSTER

Royal Army Dental Corps

THE patient was referred to hospital following removal of a lower left third molar two weeks previously, swelling and pain having persisted, and no relief being obtained from intra-oral incision and curetting of the socket area.

CONDITION ON ADMISSION

12.30 p.m., April 1, 1950. There was a large swelling at the angle of mandible, extending to side of neck. The cheek was thickened and inflamed, $\overline{678}$ were missing, and in the $\overline{8}$ socket there was a crushed Penicillin tablet and cotton packing. Temperature 98° , Pulse 100.

History was of a difficult extraction approximately three weeks ago.

TREATMENT

Penicillin was prescribed, 100,000 units four-hourly intra-muscularly and frequent hot saline mouth washes.

At 6 p.m. the patient was reported as having difficulty in breathing, with commencing stridor—use of accessory muscles of respiration was very evident. Temperature 103.2° , Pulse 114, and the fauces were very swollen. It was not possible to view the larynx although there was no apparent trismus.

The surgical specialist was called upon and under local anaesthesia the angle swelling was carefully explored by aspiration needle, but no pus could be found, and none expressed intra-orally.

The patient's condition was deteriorating and it was decided that a tracheotomy must be performed immediately. This was done under local anaesthesia without much difficulty, the patient being intelligent and very co-operative. Despite its anticipation, the relief in breathing was dramatic.

An augmentary dose of 1 million units penicillin was given and sulphathiazole commenced, 2 grammes immediately, and 1 gramme four-hourly.

The temperature at midnight was 100.4° and a sedative was given to assist rest, a well propped up position being maintained in bed.

2.4.50: The patient had a good night without disturbance, and was given a second

dose of penicillin at 10 a.m. Temperature 100°. There was some irritation from the tracheotomy tube and a fair amount of mucous discharge. A white cell count was taken and returned as 8,700 but not regarded as reliable, and a repeat ordered.

3.4.50: Swelling of angle of jaw and neck remain relatively unchanged, and X-rays were taken. Antiphlogistine dressing was applied to the neck and angle in an attempt to localize any pus. The medical specialist was asked to investigate the chest, and X-rays of this area were also taken. At midnight the patient was feverish, Temperature 103°, and in the absence of improvement from previous chemotherapy a change was made to streptomycin in $\frac{1}{4}$ gramme four-hourly. Penicillin maintained at 100,000 units four-hourly.

4.4.50: Temperature reduced to 101° and patient appeared improved, but there was only a slight change in the swelling. The dressing of antiphlogistine was discontinued. No abnormality in jaws X-rays.

5.4.50: Temperature 100°, swelling reduced and much softer. Very hard swelling of submaxillary lymph node detectable. Medical Specialist reports signs of early pneumonia, with congestive changes in both lung bases. White cell count 12,500. Chemotherapy to continue.

6.4.50: Temperature 99.4°, pulse 106. Swelling of glottis resolved, and only a slight swelling of anterior pillar of fauces

The tracheotomy tube was removed and a dry dressing placed, covered by strapping. Streptomycin changed to $\frac{1}{2}$ gramme b.d., penicillin 100,000 units six-hourly.

8.4.50: Temperature normal, neck dressing dry, wound healed well. Postural drainage of lungs commenced yesterday by medical specialist.

10.4.50: Lung bases clearing, only slight swelling of left angle of mandible. lymph node still hard, but no cervical chain. Chemotherapy discontinued.

Total dosages	...	...	7.25 grammes streptomycin
			4.8 million penicillin
			14 grammes sulphathiazole

Further recovery was steady but uneventful. The third molar socket is completely healed, and further X-rays disclose normal bone condition of the jaw. Patient discharged 19.4.50, to return in two months, when arrangements will be made for plastic repair of tracheotomy scar.

Throughout the whole course of the illness, no pus was found and the chemotherapy was originally instituted for prophylaxis. The change to streptomycin was made empirically and with obviously dramatic results.

The case is considered worthy of report in that the comparatively rare operation of tracheotomy was necessary, and the value of the new drug demonstrated.

Cases of pneumonia where the latest white blood cell count, with a polymorphonuclear leucocytosis, is nearer 20,000 c.mm. than 7,000 c.mm. are frequently sulphonamide/penicillin sensitive. I have no experience with chloromycetin or aureomycin. Cases with a marked neutropenia may be part of a general septicæmia which on occasion is due to a sulphonamide/penicillin sensitive organism, but the fulminating nature of the infection has depressed the body resistance, and only after adequate sulphonamide-penicillin therapy does a polymorphonuclear leucocytosis occur. Similarly a case presenting with a polymorphonuclear leucocytosis in the peripheral blood may be due to a septicæmia which might pass unnoticed if blood culture is omitted and the organism is sensitive to sulphonamide/penicillin when these drugs are exhi-

bited. Accordingly in cases of pneumonia, blood culture, stool and urine culture, examination of the blood for parasites, skiagrams of the chest and various serological tests may have to be carried out to establish the true diagnosis. They should always be considered. Diagnosis of a case of pneumonia on clinical, radiological and incomplete laboratory investigations is unsatisfactory. This was strikingly demonstrated in a series of cases published in the *B.M.J.* as cases of "Primary Atypical Pneumonia." It appears that samples of blood from random cases in this series were sent for examination for evidence of the "Q" fever. After the paper was published the results of the serological tests were made known and found to be positive for "Q" fever. This was acknowledged in a subsequent letter to the *B.M.J.*, November 1, 1947, page 694.

In these days of wonder drugs we must not succumb to the tendency to give a "cure all" or "near cure all" such as aureomycin is said to be and forget all about clinical signs and symptoms, radiological and laboratory investigations, and indeed forget all about a diagnosis—at least the true diagnosis. We must discourage the attitude "never mind the diagnosis; get on with the treatment, and whether that works or not why worry as long as the patient recovers." Some may call that Medicine without Tears, Toil and Sweat. There is another name for it.

I agree that adequate or empirical therapy should not be withheld a moment longer than is necessary, but then in a properly managed case treatment is not delayed. Such cases are quickly assessed on admission, all necessary investigations instituted and treatment is exhibited, especially in cases of urgency, with all speed. The passage of time reveals whether or not treatment has been of value, the results of investigations and whether or not further investigation or precautions are necessary. These have already been enumerated.

I feel that the different causes of pneumonia are not sufficiently stressed in Medical Schools, as judged by their management by young doctors launched on the public with a good knowledge of the physical signs of pneumonia but with an inadequate appreciation of their many possible causes. After all, pneumo-typhoid managed as a case of lobar pneumonia, although probably not common, is a potential danger as long as it is not recognized, at least to contacts immediate or remote. The same can be said of pneumo-typhus. It is agreed that common things are most common, but nevertheless it is essential that we should be able to recognize or suspect not so common or uncommon diseases, especially killing diseases; not just out of academic interest but in the interests of the patient and his contacts.

The first case of pneumo-typhoid I ever saw was when I was a House Physician just when Prontosil Rubrum had appeared on the market but before M&B 693 had made its appearance in hospitals. The patient was a young woman who, clinically and radiologically, appeared to be a case of "Lobar Pneumonia." The total white blood cell count was 13,400 c.mm. and there was a polymorphonuclear leucocytosis. She appeared to make satisfactory

progress and the temperature became normal, but after a few days there was a recurrence of pyrexia. She became delirious at night and deafness became obvious. Radiologically consolidation remained and on auscultation redux crepitations were audible, but no complications were discovered beyond the "unresolved pneumonia." In a hospital corridor I met an honorary consulting physician long since retired. We exchanged the time of day and he asked me if I had any interesting cases. I told him about the case of pneumonia which was causing trouble. *I mentioned the deafness.* At this he showed considerable interest and he said "Ah, pneumo-typhoid. Never forget typhoid or typhus fever in a case of pyrexia who becomes deaf without apparently obvious cause." The necessary investigations were initiated and the diagnosis of pneumo-typhoid confirmed. The patient made an uninterrupted recovery and, but for that chance meeting, would probably have been diagnosed a lobar pneumonia and its true nature never established.

As already mentioned, typhus fever is another important pitfall especially when no rash appear to help in the diagnosis. However, a palpable spleen in pneumonia is not usual but, in my experience, it is inevitable in typhus fever. As a rule, all cases with chest signs or pneumonia with associated splenomegaly normally require thorough laboratory investigation.

Slipshod and vague diagnoses are to be deprecated. In B.L.A., I remember one A.D.M.S. instructing me to visit a large German P.O.W. Hospital where the German doctors had diagnosed several cases of "Enteritis," "Diarrhœa" or "Dysentery." When I saw them the diagnosis in the majority was obvious. They were still febrile, rose spots were present as was splenomegaly. Laboratory investigation established the diagnosis of enteric group fever. In my limited experience of German G.D.M.O.s I found that they were rather apt to make a diagnosis on slender grounds, to pronounce their diagnosis in a confident manner and to stick to it at all costs. There was no compromise. However, this attitude is not just confined to the Germans. Other examples of this were cases referred to a hospital, where I was O.i/c Medical Division, as cases of nephritis. They had been treated virtually by starvation and forced fluids a la Vollhard and Farr, which Germans advocate in the treatment of acute glomerulo-nephritis with oliguria or anuria. In no case was there hypertension and in every case the urinary output was normal and the urine contained no abnormal constituents. There was œdema, however, and the diagnosis was nutritional œdema in every case! A few other "diagnoses" which can be badly used and misapplied are benign lymphocytic meningitis, serous meningitis, non-paralytic poliomyelitis, unless all relevant tests, which include Paul Bunnell reaction and serological tests for leptospirosis, etc. etc., have been carried out.

I believe that the diagnosis "Pneumonia" or "Lobar Pneumonia" is just as vague and as inadequate as a diagnosis of tachycardia, headache and pyuria, all of which are accepted in the official Nomenclature of Diseases. These

are signs and symptoms, and signs or symptoms cannot be considered to be a disease and therefore used as a diagnosis.

Everyone recognizes that in enteric group fever we should isolate the casual organism and so establish the diagnosis with certainty, even although chloromycetin may have been exhibited very early on in the disease, and rightly so. I submit that similarly in pneumonia we should pursue all relevant investigations necessary to discover and recognize the ætiological agent as far as modern knowledge lends itself. Should we all do this we would be able to diagnose our cases and know what we are treating, which is surely what is expected of a doctor.

My object in writing this short paper is to emphasize that a diagnosis of Lobar Pneumonia without all necessary steps being taken to demonstrate its cause, or likely cause, is as adequate as is a diagnosis of "Backache," "Indigestion," "Hæmaturia," "Gastric Stomach," etc. etc.

Briefly, lobar pneumonia is merely a P.U.O. with signs in the chest and should be approached, assessed, and investigated as such.

The closer the liaison between the pathologist and the physician as evidenced by the frequent appearance of the former in the medical wards and of the latter in the laboratory the greater will be the incidence of accurate diagnosis in infected diseases, while certain "rare" conditions will become less rare.

ACKNOWLEDGMENTS

Colonel A. Simson, late R.A.M.C., A.D.M.S., Lowland District, and my Commanding Officer Lieut.-Colonel M. J. Kohane, M.C., R.A.M.C., for permission to forward this paper for publication. Miss J. Russell, B.R.C.S., for typing this paper.

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At Random

CONTRIBUTIONS

"What! Write a contribution for the Corps Journal? Oh no, I am sorry, but I really don't think I could possibly write an article. I am no good at writing and, besides, what could I possibly write about? I've no special subjects on which to write,"

or

"I really haven't time and have too much to do; besides, I have no notes on any good cases or experiences."

Such is often the response to the Editor's vain efforts to secure copy and contributions from distinguished seniors or on-coming junior officers of the Corps.

And yet, both types are, or at least we may presume they are, highly educated men who must, during the course of some twenty to thirty professional examinations before entering the Corps, have written many a thesis or at least some reasonable answers to examination questions, and who must, from the very nature of the all-round professional work of the Corps, have seen a very considerable variety of cases or had a variety of professional or service experiences. And also, even in the present period of shortage of staff and officers and a multiplicity of duties, surely each could spare say two or three odd hours once every two or three years to the composition of an article for our Journal.

Surely, even with the post-war reductions in strengths, we could really expect and reasonably hope for the forty to fifty (well under 10 per cent of strength), good, interesting and instructive original articles needed to compile the Journal for a year.

Will not you, O Reader, supply our needs? Have you no hidden store of zealously kept (or should we say "jealously" kept) notes of interesting cases seen during your professional duties, or some vivid personal service experience which would be of value to others, or some special research job on which you have been engaged, or even some profound thoughts on ordinary treatments, methods or cures during the past five years from which you could provide a contribution for the Journal.

Will you not try? We would welcome any good article and give it the full publicity it deserves!

Leishman, when sitting in the mess anteroom at Millbank discussing *research*, said there were three essentials to good research work. "Before commencing any particular line of research read everything you can find which has been written on that subject. What you are about to do may well have already been done by someone else. Note and record every fact exactly as it occurs and as you find it, not as you imagine it may be. After completion write out the results of your work as a connected, considered story with conclusions, if you have any; and, because facts are always valuable, publish your results."

Surely there are many in the Corps who can follow such precepts and produce a contribution to the Journal on their results.

You will remember that in our July number we set forth briefly notes from A. M. D. on how to write an article for the Journal. If you, O Reader, do decide to submit a contribution, and we sincerely hope you will help by doing so, here are a few additional points which may be of value to your future effort.

The article of some three to five thousand words; six to eight typed, double spacing, foolscap sheets, is of the greatest value, but much shorter articles

on *Cases of Interest* or special experiences or methods are also very acceptable, even those of one or two pages. We would also welcome correspondence: critical, constructive or even destructive criticism, or informative.

Illustrations are expensive to reproduce—£5 to £7 each; and consequently owing to such heavy costs have to be omitted, reduced to a minimum or subsidised, partly or wholly, by the author. This last method is frequently used by other professional journals, the author profiting by receiving his share of free reprints. Would those who are anxious to submit illustrated contributions please remember and consider this practice.

Some contributions require an amazing amount of amendment, considerable correction and numerous notations by the Editor's blue pencil or a multitude of hieroglyphs by the compositor or proof reader. These last items also raise the cost of production of every page and are a serious factor in the expense sheet. A well-known sister journal by close attention to complete correction before submission to the printers saved about £180 per annum on the cost of production. May we therefore hope that all future articles arrive fully corrected: particularly names, technical words and stops.

May we also now, O Reader, therefore expect and receive at an early date your next contribution.

MOTION-SICKNESS¹

UNTIL the advent of modern air travel, with the exception of those unfortunates who were so susceptible to motion that even a coach or a train journey induced nausea, or those who braved the delights of merry-go-rounds, roundabouts and scenic railways, motion-sickness was practically synonymous with sea-sickness.

During several engagement and naval occasions in our history sea-sickness has been mentioned as having a bearing on the proceedings and on the efficiency of the personnel engaged. With the emphasis in modern war placed on *Combined Operations* sea-sickness, with its humiliating and crippling effect on some twenty per cent of unseasoned troops, became a serious problem which led to intensive research for preventatives or palliatives. With the present development of air, sea and even fast tank land transport for combined operations, precipitating troops into the scene of combat at short notice, this nausea and temporary inefficiency from the effects of motion, motion sickness, become of yet greater importance, as do the methods of prevention.

In our last number some extracts were given showing the results of work done in the U.S. Medical Services on *dramamine* as a remedy for sea-sickness. In more recent work in the U.S. Air Force medical research workers¹ found that *benadryl*, *hyoscine* and *artane* are as effective in the prevention of motion-sickness as is dramamine. During a round trip of the Army transport *General Maurice Rose*, a 16,000 ton ship, from New York to Bremerhaven and back.

¹ Military Surgeon, Vol. 107, No. 1, July 1950, page 76.

one thousand volunteers were subjected to test with benedryl, which is similar in chemical composition to dramamine and has proved useful against air-sickness. It was found equally effective for sea-sickness.

Experiments were carried out to test whether the several drugs useful in the prevention of motion-sickness owed their value to their antihistaminic properties. The conclusions were that the preventative and therapeutic actions in motion-sickness were not due to these antihistaminic properties.

Neither dramamine nor benadryl are recommended for use by air-crews owing to their soporific qualities. Hyoscine, which has been used in all types of motion-sickness with reasonable success, produces less drowsiness than either of the former, but has other undesirable side reactions such as dryness of the mouth and occasional visual blurring. Artane, a drug with similar action but not chemically related to hyoscine, had similar undesirable side effects.

Although none of these four drugs, hyoscine, dramamine, benadryl or artane, is in itself the complete answer to motion-sickness, there may be successful combinations of these or others which will prove the final answer to this important problem.

In the meanwhile we must presumably accept the twenty per cent loss of efficiency and rely on these known drugs combined with training and seasoning of the troops required for particular operations, even though secrecy may be thereby compromised.

Here then is an opportunity for our enthusiastic research workers to bring relief to many and increased efficiency to our "Combined-Ops" forces by the prevention of motion-sickness.

Travel

THE VISIT OF THE DIRECTOR-GENERAL TO EAST AFRICA COMMAND

BY

Colonel J. P. MACNAMARA
Late Royal Army Medical Corps

It is not often that a Command as distant from the U.K. as East Africa Command is honoured by a visit from the D.G.A.M.S. In fact, though I may be wrong, I think that our present Director-General is the first that has visited us. Taking the above facts into consideration, I thought that a short account of his visit might prove of interest to the members of the Corps both inside and outside the Command. Accompanied by the Director of Medical Services M.E.L.F., Major-General T. Menzies, he arrived at Naivasha on February 25.

Incidentally on the same flying-boat was Brigadier B. Sachs, the Director of Pathology at the War Office, who was also paying the Command a short visit.

It would be hard to find in any country a more picturesque entrance than Naivasha. The flying-boat comes down on beautiful Lake Naivasha and all around are high mountains; these combine well with the blue of the lake and the green of the grass and trees adjoining the Naivasha side of the lake. Lake Naivasha is incidentally one of a series of lakes of volcanic origin which lie on the floor of the Rift Valley, that great cleft in the earth's surface which extends from the Dead Sea in Palestine through the Red Sea, the Sudan and Central Africa right down into South Africa. The Rift Valley has a bad name in Africa as it was along it that the great slave route went both north to the Sudan and Egypt and south to the coast.

After passing through the Customs the party left by car for Nairobi, 59 miles distant. The road, which by the way is by far the best in Kenya and which was built by Italian prisoners of war, runs through some beautiful country. Just after leaving Naivasha one has the Kinangop Mountain on the left and a grassy plain on the right and very often game can be seen on either side of the road. The D.G., who is a keen Shikari, was disappointed as only a few buck condescended to take notice of his visit. The Uganda Railway can also be seen as it winds its way along the side of the mountain at a height of about 7,000 feet. The road just after passing Mount Longanot, an extinct volcano, begins to rise up the escarpment and about the bottom of the incline, just to remind one that the Italians built the road, is a picturesque little chapel. Having climbed the escarpment, the road winds through country belonging to the Kikuyu tribe. This country consists of rolling downs in many ways reminiscent of England. About 15 miles out from the top of an incline one can see the city of Nairobi lying in the plains beneath. Nairobi was reached about 1730 hours and the party were taken to Torr's Hotel which is situated on Delamere Avenue in the heart of the city. In view of the fact that next day, Sunday, February 26, we had to drive to Nanyuki, a distance of 140 miles, it was decided to have a quiet night and no entertainments were therefore put on for this first day in Kenya.

The road to Nanyuki is a pretty one, running as it does for the first ninety miles or so through the Kikuyu Reserve. It has, however, one great disadvantage, i.e. that it is only metalled for the first thirty miles; this means that in heavy rain it becomes almost impassable and in dry weather it is heavily corrugated and very dusty. During this journey one passes many typical African villages and markets and our visitor made a point of stopping in one market to see what the natives were selling and buying. The first place of real interest one comes to is Fort Hall, so named because it was one of the original outposts of the East African Trading Company in the days before the Government took over E. Africa. Shortly after leaving Fort Hall one crosses the Sagana River, one of the largest rivers in East Africa, a country in which very few rivers of any size are found.

The D.G. was all the time expecting to see Mt. Kenya, the 17,000 feet mountain which rises straight up for ten thousand feet above Nanyuki; in the event we were unusually fortunate as when within about forty miles of Nyeri a very good view of the snow-clad peak was seen; this is very unusual as at midday it is almost always shrouded in cloud. The Kikuyu tribe believe that God has his seat on this peak. Another interesting point about this mountain is that when the first European who saw this mountain reported to the Royal Geographical Society that he had seen a snow-clad mountain on the equator he was laughed out of court as the scientists of that day considered that snow could not be found on the equator; however, as is sometimes found, truth is stranger than fiction and in the event he was proved to be right. Nyeri, a very well-known European settlement, was reached at 1300 hours and the party went to lunch at the Outspan Hotel. This is one of the luxury hotels of East Africa and has beautiful gardens and a magnificent view of Mt. Kenya.

From Nyeri to Nanyuki is about 30 miles and the country changes completely after leaving Nyeri. Instead of rolling hills with trees and villages one crosses a vast open plain with the Aberdare mountains on the left and Kenya and its slopes on the right. Plenty of game exists on these plains and the D.G. was able to see many types of buck and also zebras and ostriches.

About five miles from Nanyuki one crosses the equator and on this equator is a hotel, the Silverbeck, which claims that its bar is exactly on the equator. We went into the hotel, but as it was rather late in the afternoon the bar was closed so we had to give up the idea of the drink on the equator, and going on were met at Nanyuki by Major Beare, Officer Commanding the Hospital. As the Northern Area Commander, Brigadier Jackson, was away the party was taken to the Mwingo Hotel, another luxury hotel, situated a few miles from the cantonment and on the slopes of Mt. Kenya.

The climate of Nanyuki, situated as it is at a height of 6,700 feet, is extremely pleasant and it has an added attraction that as it is a non-malarious area one has the pleasure, an unusual one in this Command, of sleeping without a mosquito net. The evening was passed very pleasantly in going around the gardens and in a dinner at which Junior Commander Thompson, the Matron of the hospital, and Major Beare were present.

Next morning the D.G. inspected the Military Hospital, Nanyuki, and at the end of the inspection he spoke to all Officers, Nursing Officers, and B.N.C.O.s and told them as much as he could of the future of the Corps and Q.A.R.A.N.C. and answered any questions. After completing his inspection of the hospital he went over to the lines of the 3rd Battalion of the King's African Rifles. He was obviously very interested at seeing for the first time an East African Military Hospital and an East African Unit with their wives and families.

After a very quick lunch at the officers' mess of the hospital the party left for Nairobi. On the way they stopped and had tea at the Blue Post, a very nice hotel in Thika and after tea all went down to see the beautiful waterfall

on the Thika River which is situated in the very pretty grounds of the hotel. Nairobi was reached at about 1800 hours and the visitors went to the Norfolk Hotel for the night. One may be surprised that they did not go back to Torr's Hotel but the fact is that it is extremely difficult to get into hotels and visitors have generally to pass from one hotel to another. This has one advantage in that visitors get a very good idea of the general standard of hotels in the town.

The morning of the 28th was spent in inspecting the Military Hospital, Nairobi. The O.C., Lt.-Colonel Verbi, R.A.M.C., and a very smart guard of honour of the R.A.M.C. and East African Army Medical Corps under the Registrar, Major Lane, R.A.M.C., awaited the inspection. The talk to officers and Nursing officers had, owing to lack of time, to be postponed till another day. The D.G. had lunch in the officers' mess of the hospital and this gave him an opportunity of meeting several officers and of talking to them in a less formal manner than was possible during the inspection. After lunch the D.G. met the G.O.C., Lt.-General Sir Arthur Dowler, and had a long conversation.

The morning of March 1 was spent in an interview with the Director of Medical Services, Kenya, and in an inspection of the East Africa Command Medical Stores and the new and old Central M.I. Room, Nairobi. At 1700 hours we left by train for Mombasa. This is a very interesting journey as, for the first part of the way, the train runs past the game park and many different types of animals can be seen.

Mombasa was reached at 0815 hours on the 2nd and the D.G. was met by Major Vincent, R.A.M.C., the O.C. Military Hospital and taken out to Port Reitz at which place the hospital is located. As the time for the inspection was 0930 hours the whole party went first of all to Major Vincent's house where Mrs. Vincent had coffee and food ready for them.

The D.G. after inspecting the extremely smart guard of honour of the East African Medical Corps, a photo of which he insisted on taking himself, went round the hospital and the African Married Quarters. This Hospital, which has only been occupied during the last nine months, is in the old R.A.F. lines. It is ideally situated on the waters of Port Reitz. The D.G. was greatly impressed with the new African Married Quarters and here again he insisted on taking photos of the African women and children outside these quarters. Some of the "totos" or African children took rather badly to the camera and let out a series of unearthly howls.

No greater contrast could be found than that between the vast open plain outside Nairobi with its cool climate and the tropical appearance and heat of Mombasa lying as it does on the shores of the Indian Ocean.

We then drove across to Nyali Transit Camp crossing on the way the bridge which separates Mombasa from the mainland. For the information of those who do not know it, the old and historic port of Mombasa, for whose possession both Arabs and Portuguese fought so many bloody battles in the old days, lies on an island. The camp at Nyali is situated on the shores of the Indian Ocean and is used both as a leave and a transit camp for families and troops.

At the time of this visit it was occupied by a great number of the families recently evacuated from Somalia as a prelude to the handing over of this territory to Italy. It is a very pleasant camp indeed and amongst its many facilities perhaps bathing on its beautiful beaches must be rated the most highly.

As the train for Mackinnon Road left at 1630 hours it was only possible to take a short drive round Mombasa in order to see some of the more interesting sights; amongst these were the statue of Mackinnon who has given his name to the now famous Mackinnon Road, the English Cathedral and the narrow entrance through which ships have to sail in order to enter the harbour of Kilindini.

The journey is an interesting one as the train climbs very rapidly from sea-level and during the first part of the way very good views are got of Kilindini, the name of the harbour of Mombasa. This harbour can take very big ships; the biggest that has yet come in being the *Ile de France*, a vessel of about 43,000 tons. In order to make the ascent from the sea the railway has to make some very wonderful curves and it is extremely interesting to look out from the window and look down on the part of the line over which one was running some five or six minutes before.

After about thirty miles the scenery which in the beginning is of a tropical variety with mango trees and coconut palms begins to change to that of the Tara Desert. The Tara Desert does not, as its name seems to imply, consist of sand; it is a large area of about 100 miles in length and 40 in breadth, which is covered with a dense mass of what is called in Africa thorn bush. There is in the whole of this area practically no water and the trees are nourished entirely by the annual rainfall of about twenty inches a year. Many a slave has perished from thirst in this desert on the way down to the coast during the bad days of the slave trade. It is in the middle of this desert of trees that the camp at Mackinnon Road is situated.

Waiting at the station to meet the D.G. were the Area Commander Brigadier Duke, the O.C. Hospital, Lt.-Colonel Robinson, R.A.M.C., and the Medical Specialist, Major Johnstone, R.A.M.C. After dinner in the mess the party was accommodated in the O.C. hospital's small house and in tents, the normal residence for the inhabitants of this station. Next morning the D.G. inspected the Hospital. The greater part of the hospital is housed in Nissen huts and it must be admitted that in appearance they often look very grim. Having completed the inspection of the hospital, a visit was paid to several other units in the area and after lunch a tour made to Mackinnon Road to see amongst other things the vast "igloos" or sheds which are being prepared to receive all sorts of stores such as ordnance, R.E.M.E., etc., which are required for a modern army; also to the main water point from which water is distributed to the various camps. It should be understood that all water for this camp has to be piped from the Tsavo River some seventy miles to the north. Strange as it may seem Mackinnon Road is a married station and the D.G. was therefore

taken round one of the married quarters which are very conveniently situated near the hospital.

Mackinnon Road camp is of course just a vast clearance in the African bush and this bush is extremely monotonous and dull to live in. Great efforts have, however, been made to improve conditions and once gardens and trees have grown up the outlook will be vastly improved. The D.G., I am afraid, appeared to come to the conclusion that Mackinnon Road was rather a grim place for troops and so it possibly is, but on the other hand, there are quite a number of officers and other ranks who like it very much, in fact prefer it to Nairobi and other stations in the Command. At 2000 hours the whole party left by train.

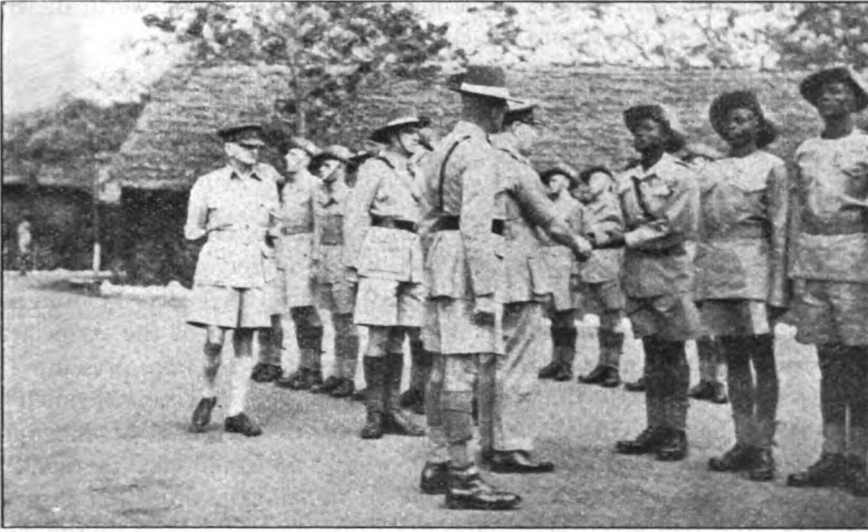
Early next morning the D.D.M.S. woke up and looking out of the window saw that Kilimanjaro, the highest mountain in Africa, was showing up in a most beautiful manner and he immediately went along to the D.G. to point this out to him. Certainly the D.G. has been lucky over mountains, first of all he saw Kenya in the middle of the day, an unusual occurrence, and now he has seen Kilimanjaro from the train, a still more unusual event. Kilimanjaro, 19,560 feet, is one of the numerous volcanoes which are found in this part of the world; it has, if rumour is correct, had an interesting history, originally in Kenya, the mountain with a small part of the surrounding territory was handed over to the German Colony of Tanganyika. This was done as a result of a request made by the Kaiser to Queen Victoria. The Kaiser told Queen Victoria that it did not seem fair that Britain should have all the highest mountains in her territories while the Germans had none in theirs. Apparently the Queen thought the argument a fair one and it was arranged that this mountain should go over to Tanganyika. It, of course, came back to us with the surrender of the German Colonies after the first world war. It is in the opinion of the D.D.M.S., who has seen many mountains, the most beautiful one that he has ever seen.

Nairobi was reached at about 0930 hours and the D.G. and D.M.S. were taken to the New Stanley Hotel, the third hotel in which he stayed during his visit. At 1200 hours they went off to visit the Governor, Sir Philip Mitchell, G.C.M.G., M.C., and a most pleasant hour was spent in conversation with our distinguished host.

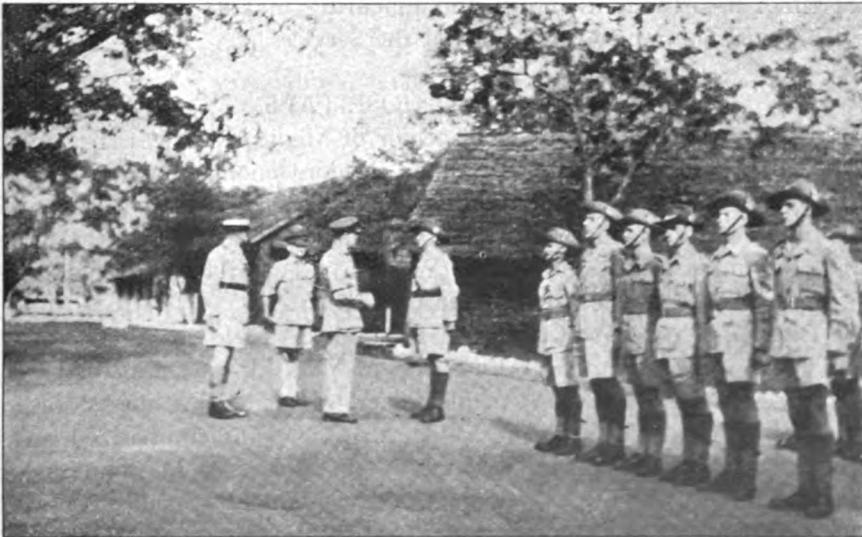
Sunday was spent as a day of rest and, knowing how interested he was in animal life, Lt.-Colonel Verbi, the O.C. Military Hospital, Nairobi, took our visitor out into the famous Game Park which abuts on the City of Nairobi. Once again, he was lucky as in addition to many other forms of animal life he saw several lions; many people in Nairobi have spent several years in Nairobi endeavouring to see these animals but without success.

On Sunday evening the whole party whom Sir Philip Mitchell had very kindly invited to dinner went off to Government House and spent a very pleasant evening with his Excellency and his other guests. Monday, March 6, was spent in going round Units in Nairobi, in a final discussion with D.D.M.S. and in going to a tea party given by the officers Q.A.R.A.N.C. Before

the party the D.G. had his talk with all the officers R.A.M.C. and officers Q.A.R.A.N.C. which had to be postponed owing to the time spent in the Military Hospital, Nairobi, being greater than had been expected. On Tuesday, March 7, the D.G. and D.M.S. left by air from Nairobi for Khartoum.



The D.G. shaking hands with Serjt-Major Lawiogutu, E.A.A.M.C., at the inspection of the Guard of Honour, Military Hospital, Nairobi.



Talking to Serjt-Major Dodds, R.A.M.C., Military Hospital, Nairobi.

In conclusion the writer would remark that all ranks, both European and African, were delighted to see the Director-General and to hear from him all the information that he could impart in regard to the Medical Services. He certainly gave us the impression that he thoroughly enjoyed his visit and that he thought East Africa a beautiful country, as indeed it is, and the writer hopes that this article will give readers some idea of this part of the world in which some of them may in the future serve.

Matters of Interest

THE BRITISH DENTAL ASSOCIATION DINNER

THE Director-General was a guest at the annual dinner of the British Dental Association which was held in the Great Hall of the University, Birmingham, on Wednesday, July 12. Mr. H. T. Roper-Hall, President of the Association, occupied the chair and more than 500 members and guests were present. The Director-General replied to the toast of the guests and said he welcomed the opportunity of paying tribute to two distinguished members of the dental profession. One was Brigadier Broderick, whom he would like to thank for his service for five years as consultant to the Army, and the other was Professor Humphreys, who had given very long and distinguished service in the Territorial Army. He would also like to express his gratitude to his old friend Major-General Higgins, who had a very wide experience of the dental services in peace and war. The Dental and Medical Services played a great part during the war, and he would like to thank the dental profession for all that they did at that time; in orthodontic work and in curing maxillo-facial injuries they made a big contribution to the morale of the Services.

CAMPS AND HOSPITALS

The Director-General, with the Inspector of Medical Services (Brigadier F. Escritt), and D.D.M.S., Western Command (Major-General J. M. Macfie), paid a visit to Territorial units in camp at Llanbedr on the shores of Cardigan Bay on July 10. The units included 160 Field Ambulance (Swansea), No. 3 (Western) General Hospital (Cardiff) and No. 8 (Western) General Hospital (Liverpool). A visit was also paid to the Military Hospital, Chester.

The Director-General paid a visit to 152 and 153 Field Ambulances of the Highland Division at camp near Pickering in Yorkshire accompanied by the Inspector of Medical Services. A medical exercise was carried out by the Field Ambulances on the evacuation of casualties. One point emphasized was the advantage which was gained by having two medical units in camp together. In this way it was possible to carry out exercises more realistically and the medical officers of one unit were able to act as medical umpires.

A visit was also paid to the Military Hospital, York, where a wing of the

hospital has been given to the National Health Service for civilian use. A total of between 500 and 600 civil patients have now been admitted to this wing and the waiting lists of patients for admission to civil hospitals in York as a result have been dropped down from eleven months to five months. The experiment has been an unqualified success.

VISITS

The Director-General gave an address to the officers of the Staff College, Camberley, on the subject of "Health Discipline" on July 31.

Medecin-General J. Voncken, Secretary-General to the International Committee of Military Medicine and Pharmacy, paid a visit to the Director-General on July 31 and was received by Mr. Newling of the Ministry of Defence on August 1.

Major-General F. Kingsley Norris, Director-General, Australian Army Medical Services, gave an address on August 2 at the Royal Army Medical College.

ANNUAL DEDICATION SERVICE

The Director-General attended the British Red Cross Society's annual Service of Dedication at St. Paul's Cathedral on July 11.

THE ANNUAL DINNER

The Warrant Officers and Sergeants held their annual dinner at the Palmerston Restaurant, Bishopsgate, E.C., on July 15. In his speech, the Director-General referred to the good prospects of promotion which were now open to non-commissioned officers in the Corps; he referred to the higher standards which were expected from N.C.O.s in the different trades and the necessity of aligning these trades with similar civil trades in order that recognition for the Army trades would be given by the representative civil bodies. The Leishman prize for dispensing had been won by S/Sjt. W. G. Cavell, B.M.H. Mombasa. The Director-General then referred to the sporting events which had taken place during the year and in which the Corps had distinguished themselves but without this year winning the Army Soccer or Rugger cups.

The company of about 150 sat down to dinner under the chairmanship of Sjt.-Major Hanlan and other guests who were present included: Major-Generals R. E. Barnsley, F. Harris and H. J. Higgins, Colonels W. A. D. Drummond, R. Murphy, E. H. Hall and T. I. Dunn, and Lt.-Colonel C. E. Bull.

RECEPTIONS

The Director-General and Lady Cantlie attended a reception at Hyde Park Hotel which was given by the American Military Attaché, Major-General Lennard and Mrs. Lennard to meet Colonel and Mrs. Kessinger, the Military

Attaché Designate to the American Embassy; the Sovereign's Parade at the Royal Military Academy, Sandhurst, on July 21, and the reception given at St. John's Gate, Clerkenwell, by the Lord Prior of the Order of St. John of Jerusalem to meet Dr. Van Zyl, the Governor-General of South Africa.

The D.G. also attended a luncheon party at the King Edward VII Sanatorium at Midhurst which was given by the governing body. Dr. Todd, who is the President of the Sanatorium, is the consultant in Tuberculosis to the Army. They visited military patients who were in hospital at the sanatorium which included some nursing officers of the Q.A.R.A.N.C.

The members of the Army Medical Advisory Board were received by the Secretary of State for War on July 26. The following members were introduced by the Director-General:

Chairman, Lord Webb-Johnson.
 Lord Moran,
 Sir Arthur Porritt,
 Dr. Boland and
 Dr. Cullinan.

Correspondence

THE EMPLOYMENT OF THE NEW FIELD AMBULANCE

DEAR SIR,

It would appear to me that Colonel Richardson's objections to the new Field Ambulance and to General Dowse's recommendations for its employment arise from his desire to perpetuate the use of the old M.D.S., a sub-unit which was designed to cater for the evacuation of wounded from a division in action.

In my opinion the complete Field Ambulance should now be regarded as a Brigade unit, and employed briefly as follows:

One C.C.P. is attached to each Battalion of the Brigade, and acts as a loading point for evacuation of Battalion casualties to the A.D.S. It should normally be sited at the furthest forward point to which 4 x 4 ambulance cars or ambulance jeeps can be taken. Often this will be in the R.A.P., and the R.A.P. and the C.C.P. can then be advantageously combined. The A.D.S. should be on the Brigade axis somewhere in the vicinity of Brigade Headquarters, and evacuation from there is to C.C.S., Advanced Surgical Centre, and, for the sick, to the Divisional F.D.S.

This, of course, implies that with two Brigades up, two A.D.S.s will be open. This is tactically sound, as the third Field Ambulance is still with the reserve Brigade and is available for use when required, while the F.D.S. is available as a holding unit for minor sick, etc., the traditional function of the third M.D.S. Casualties in the divisional area are catered for by one of the

reserve C.C.P.s and, if necessary, by the F.D.S. These units can evacuate direct to C.C.S., etc.

During the late campaign in Italy, I commanded an Indian Light Field Ambulance with an Infantry Brigade. This unit had a W.E. of a Headquarters, and four sections which approximated in strength to the modern Field Ambulance, and I generally deployed it along the lines advocated. Having previously worked on the old A.D.S./M.D.S. system, I was very much impressed by the greatly increased speed in evacuation, adaptability and ease in tactical handling of the new unit. To the best of my knowledge, it was the only unit so employed in the late war.¹

In my opinion, one of the great advantages of the new Field Ambulance is that it provides less facilities for the over-treatment and over-feeding of casualties. Repeatedly one found that patients were being delayed in an M.D.S. for unnecessary treatment and meals and for ill-timed transfusions. The most important single factor in the evacuation of casualties is speed, and all other considerations must be governed by this.

I am, Sir,

Yours faithfully,

D. WRIGHT,

Lieut.-Colonel, R.A.M.C.

¹ This was originally the normal establishment of *all* Field Ambulances of the Indian Army and they were used as such during the War.—Ed.

Reviews

NON-GONOCOCCAL URETHRITIS. By Dr. A. H. Harkness. Livingstone. 1949.
Price 52s. 6d.

With the discovery that the gonococcus was sensitive to penicillin it was thought by many that the work of the venereologist had been halved. The error of this assumption is proved by this interesting monograph which covers a long list of non-gonococcal causes of urethritis, ranging from simple bacteria to the "South American Catfish."

The importance of viruses as a frequent cause of urethritis is stressed, and Reiter's Disease is allotted a large place. Although in the treatment of this type of disease we now have many new substances at our disposal, it is significant to note that urethro-vesical irrigations still have an important roll, a fact which is too often forgotten.

The volume is a handsome production, with many excellent and helpful illustrations, and is an important addition to the venereologist's reference library.

J. B.

A TEXTBOOK OF PSYCHIATRY. By Sir David Henderson, M.D.Edin., F.R.F.P.S. Glas., F.R.C.P.Edin. and Lond., and the Late R. D. Gillespie. Seventh Edition. London: Oxford University Press. 1950. Pp. 740. Price £1 12s. 6d.

A new edition of this standard textbook is always important in the literature of British psychiatry. During the last decade the interrelationship of psychological, social and forensic medicine has become more firmly established, and the distinguished author of the present edition is particularly well qualified to give a rational, comprehensive and well-balanced account of psychiatric knowledge as it is to-day.

The new edition shows every evidence of careful revision, and although the bulk of the text and the detailed, informative case-histories remain unchanged, additions have been made throughout to bring the book up to date. The chapter on Psychopathic States has been rewritten, and the references to physical treatment have been expanded to include new data on leucotomy and narcotherapy.

For the Service psychiatrist this is a valuable book of reference, and one that should be included in his personal travelling library. H. P.

REPORT ON A VENEREAL DISEASES SURVEY OF THE AFRICAN IN SOUTHERN RHODESIA. R. R. Willcox.

This is a most readable report, which must be of great value to the Chief Health Officer of the Government of Southern Rhodesia. It could with advantage be studied by medical officers of health in other parts of the world, who would find much to help them in planning surveys, not only for venereal, but other contagious diseases, the prevalence of which might be a source of worry.

One is surprised to learn that, in many centres in the area, diagnosis rests largely on the clinical acumen of the doctors in charge; aids to diagnosis in the shape of microscopes or dark-ground condensers not being available. Adequate treatment also is hampered by two factors, lack of penicillin, and the disinclination of the natives to attend for weekly arsenical injections after the local lesions have healed. In this connection it is surprising to see that, in the treatment of early syphilis, it is recommended that women should receive more treatment than men, in the shape of weekly injections of bismuth for ten weeks. Is this because it is considered women need additional treatment, or because it is felt that the men would never attend for the bismuth injections?

Of the 37 tables included in the report is one of particular interest (No. 34). A Comparison of Venereal and Non-Venereal Groups, which illustrates the part education and marriage play in reducing the incidence of venereal disease. In the Venereal Group, 38 per cent had been to school, compared with 82 per cent of the Non-Venereal group. J. B.

Obituary

Major BRUCE MALAHER

On July 18, 1950, in Reading, Major Bruce Malaher, R.A.M.C. (Retired). Born September 16, 1887, he took the L.R.C.P.&S.I. in 1913. Having served as Temporary Surgeon Royal Navy in 1914-15 he was appointed Temporary Lieutenant R.A.M.C. July 26, 1915, and promoted T./Captain July 26, 1916. He was appointed to a permanent commission October 1, 1919, and retired receiving a gratuity October 6, 1926. He was M.O. Guards Depot in Warley 1927-1928, and subsequently as Surgeon to the Booth Steamship Company.

He rejoined December 15, 1940, and was promoted Brevet Major the same day, being released March 8, 1948. During 1915-19 he served with the Egyptian Expeditionary Force from June to October 1916, in Mesopotamia from October 1916 to July 1917, in Italy from February to September 1918, and in France from October 1918 to July 1919, receiving the 1914-15 Star, British War and Victory Medals.

During the 1939-45 War he did not serve overseas till appointed to a Hospital Ship, December 27, 1945.

In continuation of the Obituary Notice in the Journal, No. 6, June, 1950. The estate of Lieut.-Colonel F. S. Le Quesne, V.C., R.A.M.C. (Retired), who died in Clifton, Bristol, April 19, 1950, is shown at £59,746 (net £59,431).

Notices

THE Ministry of Defence are offering an appointment for a retired medical officer in the Joint Intelligence Bureau. The work consists largely of compilation of medical surveys with particular reference to possible military operations world wide. The salary for the appointment is £800 x £25 — £1,000, subject to an abatement of 10 per cent in the case of an officer in receipt of retired pay. The appointment is likely to be vacant at the beginning of March 1951.

Those interested should forward their names to the War Office (A.M.D.1) direct.

JOURNALS RECEIVED

THE following journals have been received and are available in the Library of the R.A.M. College.

Practitioner, Military Surgeon, Medical Press, Bull. of Hygiene, Medical Journal of Australia, Lancet, Brit. Med. Journal, South African Medical Journal, Indian Jour. of Medical Research, Journal of the R.S.I., Glasgow Medical Journal, Bull. of the Johns Hopkins Hospital, Indian Journal of Malariology, Post Grad. Medical Journal, Journal of the Royal Institute of Public Health and Hygiene, St. Bart's Hospital Journal, British Med. Bulletin, Chronicle of World Health Organisation, Revista de Medicina Militar, Proc. of the Royal Soc. of Medicine, Journal of the R.A.S.C., Bull. International des Services de Santa, Tropical Diseases Bulletin, Edinburgh Medical Journal, Journal of R.A.V.C., Clinical Proceedings, Indian Medical Gazette, Journal of the Royal Egyptian Medical Assn., Revue du Corps de Sante Militaire, Archives del Hospital Universities, Quarterly Journal of Medicine, Military Review, Journal of Biology and Medicine, East African Med. Journal, Clinical Journal, U.S.A. Forces Medical Journal, British Journal of Dermatology and Syphilis, Canadian Journal of Public Health, Journal Royal Naval Medical Services, London Hospital Gazette.

Journal

OF THE

Royal Army Medical Corps

ISSUED MONTHLY



EDITOR

LIEUT.-GENERAL SIR TREFFRY THOMPSON,
K.C.S.I., C.B., C.B.E., M.A., D.M.

MANAGER

MAJOR H. W. PECK, R.A.M.C.

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CORRECTIONS

I. Vol. XCV, No. 4, page 232—

Lead on from bottom of page to line 39 on page 235.

Page 235—

Last paragraph on page leads on from page 232, and the remainder of the article on pages 236, 237 and 238 should follow.

II. Vol. XCV, No. 3, page 164—

For LESSONS ON OPERATIONS, MALAYA, By Captain D. C. Dow,
Read LESSONS ON OPERATIONS, MALAYA, By Captain T. W. BARNES, M.B.,
B.S., M.R.C.S., L.R.C.P., *Royal Army Medical Corps.*

This also applies to CONTENTS on front cover.

Both errors are regretted.

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made and the opinions expressed in their papers.

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Original Communications

PERSPECTIVES IN THE CONTROL OF EPIDEMIC INFLUENZA

BY

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PART I

PROGRESS IN RELATION TO AIRBORNE INFECTION

MODERN progress in the control of the infectious diseases of man and animals has been astonishing. The era of modern sanitation which has been so successful in diminishing the toll from the zymotic diseases has been succeeded so swiftly by the discoveries of chemotherapeutic and antibiotic agents that it is hard to adjust oneself to the pace of advance and to see clearly what can and cannot be done at the present time. A useful perspective may be obtained from the Table I below which gives for comparison the mortality from various infective diseases in Great Britain at the beginning and mid-point of the present century. It is clear from this table that though the death-rate has fallen in every instance, the degree of reduction varies greatly, being

TABLE I.—DEATHS FROM ZYMOTIC DISEASES IN 1898 AND 1948

Cause of death	Number of deaths		Death-rates per million	
	1898	1948	1898	1948
Measles and rubella	13,260	329	422	8
Influenza	10,405	1,240	331	29
Whooping-cough	10,175	748	324	17
Diphtheria	7,661	156	244	4
Enteric fever	5,708	48	182	1
Scarlet fever	3,548	36	113	1
Smallpox	253	0	8	0
Chicken-pox	116	10	4	0.2
Typhus	47	0	1	0
Cholera, diarrhoea and dysentery	30,096	3,131	959	72

(Modified from Percy Stocks, Table V, *Brit. med. J.*, 1950, 1, 55.)

particularly impressive in the case of enteric fever and diphtheria. Yet, the mortality from diseases such as scarlet fever and measles has also declined even though specific measures of control have not been developed against them. The position in regard to influenza and whooping-cough is, however, much less satisfactory and if figures for morbidity as opposed to mortality rates were available, there would be still less cause for congratulation. The unsolved problem of influenza is not, however, best visualized by reference to a table of this sort because of its characteristically epidemic incidence. The wider view of a century of experience is necessitated and a consideration of influenza over such a long period yields some interesting facts (Martin, 1950).

The first of these is the virtual extinction of influenza in the years following the outbreak of 1847 with particularly low levels immediately prior to the great pandemic of 1890. Secondly, ever since 1890 influenza has maintained annual epidemics much greater in incidence than in the previous forty years, the peak being reached in the pandemic years of 1918-19. Thirdly, since 1930, the annual peaks have attained generally lower levels particularly in the last seven years (fig. 1). Martin (1950) points out that this recent subsidence in influenza is shown not only by the reduction in the height of the peaks but also

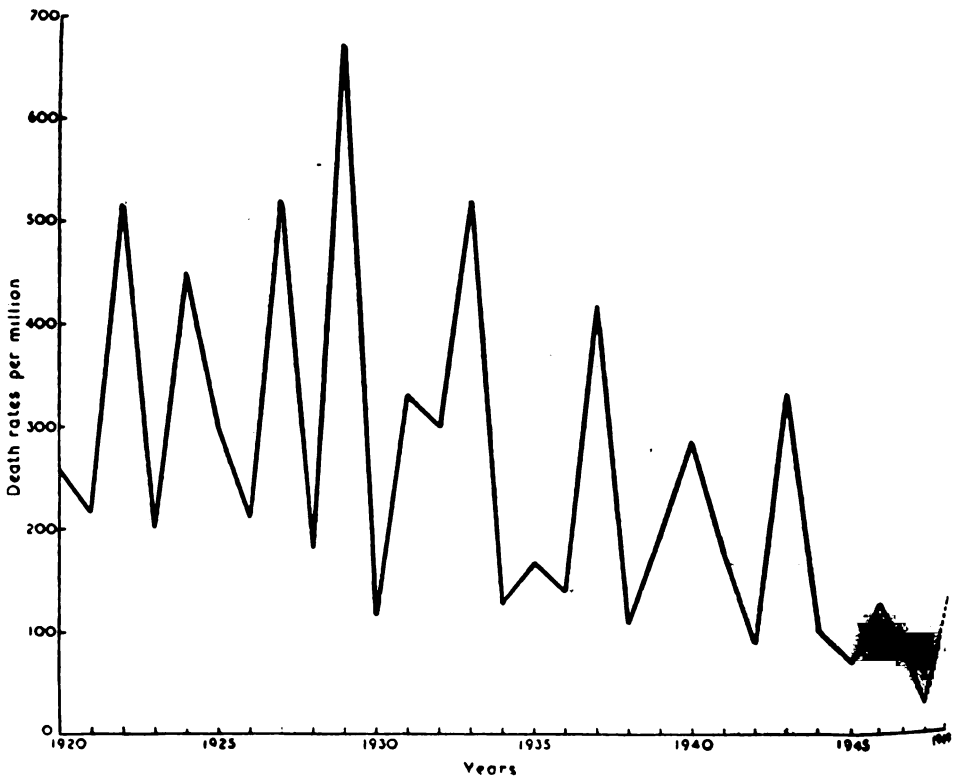


FIG. 1.

(After W. J. Martin, 1950, *Brit. med. J.*, 1, 267.)

in a diminution in the base-line in between the epidemic prevalences, and hazards an opinion that if the present trend in influenza mortality continues, a further period of virtual extinction as in the years preceding 1890 may occur.

Since 1932 when the influenza virus was first identified in the laboratory by the pioneer work of Smith, Andrewes and Laidlaw (1933), it has been possible in this country to identify the viruses causative of the various British outbreaks. This information has been of great epidemiological significance, for it has shown that influenza virus infection does not occur annually. It thus appears that the peaks of influenza mortality as shown in fig. 1 are associated with infection by the influenza viruses chiefly of that serological type referred to as A but that the intervening troughs of mortality occurred in years when neither this nor the B group of the influenza viruses were recovered. In other words, the statistical approach to influenza mortality is obscured by the existence of other clinically similar respiratory tract diseases which are unrelated ætiologically to the known influenza viruses. Yet, both the influenza virus epidemics and the unknown conditions of the respiratory tract appear to have undergone cyclical changes which are hard to relate to known conditions of life. The essential perspective which must be attained is thus that of a changing pattern of disease related in all probability to the ecology of man and of the viruses which flourish in the human respiratory tract. Against this background all past attempts at prophylaxis have been puny experimental probings which have left unsolved almost as many problems as those for which they have suggested a solution.

MECHANISM OF SPREAD OF INFLUENZA

The history of those virus infections which thus far have yielded to human attempts at control indicates that success is likely when methods of spread have been clearly delineated. Thus, smallpox prophylaxis in this country at present depends as much upon the limitation of spread from known cases and contacts as upon immunization with vaccine lymph. Yellow-fever control is likewise dependent equally upon the destruction of mosquitoes and upon immunization. The factors which govern the spread of influenza and other airborne virus infections of the respiratory tract are, however, still obscure.

Airborne infection is possible in three main ways : via the minute droplets and droplet nuclei which float and remain suspended in the air for long periods, via the larger droplets with a short trajectory such as are expelled in sneezing, and via dust particles contaminated with dried secretion. Experimental studies with influenza virus (Bourdillon and Glover, 1948) have shown that ferrets can be infected by airborne particles either fine (3–6 μ) or coarse (16 μ) in size and the former-sized particles are capable of remaining suspended in air for considerable periods. Virus can also be recovered in an infective form after drying on a blanket, or in the form of dry dust exposed near a ferret infected with influenza (Edward, 1941). Thus all three methods of contagion of influenza by airborne routes are theoretically possible, yet it is still not known whether any one of the three methods is more important than

the others from the standpoint of human epidemics. A consideration of the number of droplets, many of large size, which are expelled during a single sneeze, leads one to the conclusion, however, that direct contagion from one individual to another is a more likely mode of spread than indirect methods involving dust or contaminated air.

The source of infection seems obvious in the case of influenza because large amounts of virus can be demonstrated in the nasal and throat secretions during the early phases of the disease. However, virus has been clearly demonstrated in the throat of a healthy individual during an outbreak of influenza so that at such times apparently healthy persons may act as sources of dissemination of virus. Well-recognized instances indeed exist of outbreaks of influenza which appear to have followed the paths of travellers from an infected area to other areas previously unaffected, and such travellers may have remained clinically well in the intervening period (Hare and Mackenzie, 1946). There is thus good evidence that influenza may reach a community either by a direct chain of infection or by the medium of healthy carriers. But the question of the mode of persistence of virus within a community is still unsettled. There is little direct evidence to support the view that influenza virus remains latent in a particular community in between epidemics for proven sporadic cases of virus infection are relatively uncommon. Nevertheless some events strongly suggest that a community can in fact be carrying virus even though overt cases of influenza have not occurred amongst it for some considerable time. Thus in the Ocean Island outbreak described by Isaacs *et al.* (1950), a severe epidemic of influenza A occurred among immigrant Polynesian labourers and followed on the heels of the arrival of a ship from China conveying Chinese workers. The latter did not fall ill during the epidemic of influenza but serological evidence after the outbreak suggested recent influenza virus infection amongst them. The ship carrying the Chinese workers had been overcrowded and coughs were prevalent but there had been no outbreak of influenza; the journey had occupied three weeks and the Chinese labourers were placed in quarantine for twenty-four hours after landing. The outbreak began nine days after release of the Chinese from quarantine. It is difficult not to accept the view that the Chinese "herd" had come to terms with the virus which they brought with them and that from this source the infection spread to the virgin soil of the Polynesians in whom it evoked a high percentage of clinical attacks. A parallel may perhaps be drawn between such occurrences and the school outbreaks of influenza familiar in this country. Epidemics of influenza usually begin within the first week of assembly of scholars (School Epidemics Committee, 1938) and this circumstance suggests a build-up from the admixture of virus-infected individuals with susceptibles consequent upon the bringing together of the community once more.

The method of evolution of influenza epidemics in a military community is very difficult to analyse. The view that recruiting initiates an unstable situation from the standpoint of respiratory tract infection is certainly a sound one. Epidemics of respiratory illness are far more severe in establishments

with a high rate of turnover than in stable human groups. But laboratory investigation of these recruit outbreaks indicates that influenza virus infection is heavily outnumbered by a condition termed febrile catarrh or acute respiratory disease (A.R.D.). The prolonged studies of the American Commission on Acute Respiratory Diseases during World War II established this fact on a firm foundation and British experience (Stuart-Harris, 1947) agrees with their findings. When the influenza virus becomes active in a community such as a Training Centre it may well be unappreciated clinically that any change has occurred because of the clinical resemblance of febrile catarrh to influenza. Indeed if a severe outbreak of influenza does result, it is usually appreciated on the basis of the numbers of those clinically ill rather than on the appearance of unusual clinical characters. Nevertheless, as the American workers at Fort Bragg have shown (Commission on Acute Respiratory Diseases, 1948) the conflagration of influenza may involve seasoned men and recruits to an equal extent, whereas febrile catarrh is almost exclusively confined to recruits with less than three months' Service experience. It is therefore impossible to dogmatize concerning the origin of outbreaks of influenza virus infection in Service communities although in this country, at any rate, the military are involved as an integral part of the community when the civilian herd becomes the battleground for the virus-host interaction.

Finally, the concept of global spread of influenza must be mentioned because consideration of recent experience in connexion with the Influenza B wave of 1945-46, and the influenza A epidemic of 1949 (Andrewes, 1949), indicates that a distant origin is at least as probable as a local resurgence of infection. The events of 1949 indeed indicate most clearly that whether the influenza epidemic of next winter is to materialize or not may depend on events in an area remote from these shores. This, no doubt, is the reason for the success for a time, of quarantine measures applied to whole islands, as was done in the case of Australia and of the Samoan islands in 1918. Quarantine, however, merely postponed the epidemic in Australia and it cannot be regarded as a practicable measure when applied to entire communities.

THE DEVELOPMENT OF METHODS OF CONTROL OF AIRBORNE INFECTION

A formidable spate of publications appeared during and after World War II which reported experimental and field observations on methods of combating airborne infection. Amongst these were the observations of British workers (van den Ende *et al.*, 1940 ; van den Ende *et al.*, 1941) on the value of dust-laying measures in the prevention of periodic pollution of the air such as occurs during sweeping a floor, bed-making and so on. Dust-laying alone is not, however, effective against infection by airborne droplets and for these, methods of aerial sanitation aimed at the direct destruction of bacteria suspended in the air, or of the trapping of infected droplets, have been developed. Nevertheless, although it has been abundantly demonstrated that it is certainly possible to reduce greatly the bacterial content of the air of a room, it is a far cry from this to the prevention of airborne infection owing to the

universality of the atmosphere and the impossibility of application of the sterilizing procedure except on a restricted scale. The two main lines of work which have been followed have been air-sterilization by chemical aerosol droplets and vapours, and by ultraviolet irradiation. In addition to this, the effect of increasing the rate of ventilation of the air and of interposing a barrier such as a mask must be mentioned.

(a) *Chemical Disinfection*.—The work of Bourdillon and his associates at the Medical Research Council's laboratory is the most important British contribution to this subject (Bourdillon *et al.*, 1948). It is not possible to summarize the work adequately in an article such as this ; but chemical disinfectants are regarded as being of greatest assistance in special situations, such as rooms where clean air is particularly needed, or during epidemics of airborne disease. There is a wide choice of chemicals including hypochlorites, triethylene glycol, propylene glycol, resorcinol and alkyl resorcinols, lactic acid and other hydroxy-acids. The compound α -hydroxy-amethyl butyric acid possesses many theoretic advantages but is less easy to obtain than lactic acid. Resorcinol is particularly suitable for intermittent disinfection for short periods. All these chemical agents can be dispersed into the air by more than one method but vaporizers or hand sprayers appear to be the most important. Their efficacy in disinfecting the air is not to be doubted though with the exception of lactic and other hydroxy-acids, their activity is much greater against suspended droplets than against dry dust particles. It is not the purpose of this paper to outline the circumstances governing the efficacy of measures such as chemical disinfectants. These are fully detailed in the Medical Research Council's report, but their major limitation is clearly that they can do little more than to lessen the risk of contagion by airborne droplets possibly emanating from a distant source. They are clearly ineffective against direct contagion during coughing or sneezing which as already suggested may be important in relation to the spread of influenza.

(b) *Physical Methods of Disinfection*.—The simplest methods of sterilizing air, either by heat or filtration, are of course effective when the air of individual rooms or of buildings can be dealt with in this manner. Bourdillon and Colebrook (1946) have shown the efficacy of a ventilation plant installed in a dressing-room for burns whereby a positive air-flow over the vicinity of the patient of clean filtered air avoids a superadded wound infection during the manipulation of dressings. Nevertheless such methods are of restricted application whereas the irradiation of the air by ultraviolet light can be applied on a much larger scale. Ultraviolet radiation is of chief significance in relation to airborne droplets and is relatively ineffective against dust-borne organisms ; it is, however, most effective at low relative humidities of the air thus contrasting with chemical agents which are more active at high humidities. The application of ultraviolet radiation in field trials has been chiefly explored in the U.S.A. as will be mentioned later. Care must be taken to restrict radiation to the upper air of rooms or to act as a barrier or screen at an entrance to a room because of its harmful effect upon the eyes and skin.

(c) *Trapping of Droplets by Masks and Handkerchiefs.*—It has been repeatedly pointed out that the foundation of work on aerial sanitation is insecure because the relative importance of the variously-sized infective droplets in the transmission of infection is unknown. Granted that influenza can be transmitted by minute particles suspended in the air for long periods, it is still not certain that this is the usual method of spread compared with the direct contact between individuals during talking, coughing and sneezing. For such methods of transfer, it is necessary to adopt more direct methods such as the use of masks in order to encourage expelled droplets into a downward trajectory. The difficulty in persuading individuals to wear masks is, however, considerable. A more practicable measure is to encourage the use of handkerchiefs which will trap the droplets. Dumbell *et al.* (1948) have shown, however, that handkerchiefs alone are a possible source of contagion because of the number of bacteria liberated on shaking them, and the incorporation on the handkerchief of a disinfectant such as hexyl resorcinol (Dumbell and Lovelock, 1949) is therefore suggested as a measure of some practical importance.

PRESENT SIGNIFICANCE OF METHODS OF AIR HYGIENE

Practical application of the various techniques developed to attack the problem of airborne infection has hardly progressed yet beyond the stage of experimental gropings. Trials in hospital wards, schools, canteens, mess decks, underground shelters and the like have been made by workers both in this country and in the U.S.A. But a critical evaluation of these techniques in terms of their effect on airborne contagion is not forthcoming in many instances. Clearly it is not enough to be able to say that the bacterial content of the air is reduced. What is wanted is an estimate of the decrease in respiratory tract infection, if any, which has been achieved. Furthermore, the value of the measures in terms of the particular bacterial or virus infections encountered is desired rather than a block estimate of undifferentiated sickness. This latter point raises the difficulty of diagnosis which has been a stumbling-block in many of the investigations. The hotch-potch of acute respiratory disease includes streptococcal infection of the throat, influenza and the ætiologically unknown febrile catarrhs, atypical pneumonias and the common cold. It is by no means to be expected that bacterial and virus infections will respond equally to the various measures employed.

The most promising experiments so far have centred around the limited problem of cross-infection in wards such as children's and infants' wards, dressing-rooms and so. The hæmolytic streptococcus is a most important cause of such cross-infection and there seems no doubt from the work of Wright and her co-workers (Wright, Cruickshank and Gunn, 1944) that a significant effect on cross-infection by streptococci in cases of measles may be obtained by dust-laying on floors and bedding by oil especially if conditions are favourable for a high rate of infection. Other workers (Rountree, 1947) have had less success, however. Ventilation and ultraviolet light radiation have also given helpful results. One of the most interesting studies is that from the Cradle clinic

at Evanston (Rosenstern, 1948). A combination of air-conditioning, mechanical barriers and germicidal lights have been found to be effective in reducing cross-infection not only of the skin but also of the respiratory tract so that it has not been necessary, for instance, to exclude nurses with colds from the unit. But, it cannot be emphasized too much that the problem of cross-infection in such restricted surroundings is not really comparable with that of the prevention of respiratory infection in the field.

Field studies on any considerable scale have been largely carried out in the U.S.A. although valuable field data in relation to the reduction of bacterial contamination of the air have been obtained in this country by Bourdillon and his associates (Bourdillon *et al.*, 1948). American workers have largely concentrated on the use of ultraviolet radiation and dust-control so that there is a dearth of information regarding the value of chemical measures of disinfection. An instance of the apparent uselessness of such measures when applied to a limited portion of an individual's aerial environment is provided by McConnell (1949). Triethylene glycol was vaporized into the air-duct of a room housing 500 workers at an Insurance Company's offices, a similar room being kept as a control. No significant difference was obtained in the incidence of minor respiratory illness in those individuals supplied with treated air, but as the bacterial content of the air was also unaffected, it may be doubted whether the technique was really efficacious. The majority of field workers, however, have concentrated on measures to restrict airborne infection during sleep, and studies from the U.S. Army and Navy demand pride of place because of their careful and extensive nature.

The Commission on Acute Respiratory Diseases (1946*a, b*) carried out two experiments at Fort Bragg in an effort to evaluate the effect of double-bunking in barracks and also the effect of dust-laying procedures. Double-bunking in the barracks of two platoons of a training battalion was associated in 1943-44 with a significantly lower rate of acute respiratory disease (febrile catarrh) than the normal procedure of housing in single bunks in the barracks of two control platoons. Although an outbreak of influenza A occurred during the period of observation, the troops were then engaged on field manœuvres so that the relative incidence could not be compared. During the winter of 1944-45, oiling of bedding and of floors of barracks, mess halls and recreation halls was carried out in the quarters of certain platoons of four training battalions. The Commission found that there was some reduction in the admission to hospital of cases of respiratory disease in an endemic period but that no advantage was found in the "oiled" group during an epidemic period of acute respiratory disease. No influenza or streptococcal outbreak occurred during the winter. These studies were carried out amongst recruits in whom a high incidence of respiratory disease was to be expected. The dust-laying procedure was certainly effective in reducing the bacterial contamination of the air, and the apparent ineffectiveness of the measures as a whole may have been due to the type of respiratory disease prevalent during the period. This diagnostic differentiation is of great importance in all such field experiments in view of the possibility that

streptococcal infections may be controlled by dust-laying measures more readily than those due to viruses. Thus the experiments reported by Anderson, Buchanan and MacPartland (1944) in which a striking difference in respiratory infections during a three-month period in a British Army unit was attributed to oiling of floors, can be criticized because of the absence of diagnostic procedures among those reported ill with respiratory infection and also because of the short period of observation.

Results similar to those obtained at Fort Bragg were obtained by Sheehmeister and Greenspan (1947) at a U.S. Naval Training School. During a thirteen-month period the oiling of floors and blankets reduced air contamination and lowered the carrier rate for hæmolytic streptococci. However, no apparent effect was observed on the rate of respiratory disease including catarrhal fever, tonsillitis and pharyngitis and scarlet fever during a period of high incidence, although some slight reduction was seen during a period of low incidence. A more prolonged series of studies also carried out in the U.S. Navy was reported from two Naval Training Stations between 1943 and 1947 (Willmon, Hollaender and Langmuir, 1948; Langmuir, Jarrett and Hollaender, 1948). The major plan of this study was the installation of ultraviolet lamps in the barracks in order to provide an intense radiation of the upper air and of the floors under the bunks and in the aisles. Dust-laying procedures were combined with the radiation in some years. In each of the four years of this study the total admissions to hospitals from respiratory diseases were consistently lower from the radiated groups than from control groups. The degree of reduction was 20 to 25 per cent. However, during an explosive outbreak of influenza A in 1943, the difference in admissions from the radiated and control barracks was insignificant. Also during an outbreak of hæmolytic streptococcal infection, dust-laying measures alone and uncombined with ultraviolet radiation were ineffective in controlling the epidemic.

Although the results of these studies may at first sight seem disappointing and even at variance with each other, some general conclusions appear possible. The first point seems to be that single measures alone are less effective than a combination of measures. Secondly epidemic periods whether of bacterial (streptococcal) or of virus infection appear to resist those measures which have been tried, whereas endemic periods of respiratory illness can definitely be influenced. Thirdly, the methods which have been tried may have failed because they are inefficient in regard to the degree of aerial disinfection which they achieve or because they do not affect the mode of spread which is normally utilized by the acute infections of the respiratory tract. Clearly, the need for continued research in regard to both these possibilities is urgent if any advance is to be made.

CONCLUSIONS

The epidemiological background of influenza and other acute virus infections of the respiratory tract is one of great variability. Experience in the past twenty years in this country suggests that, at present, a gradual decline in intensity of outbreaks and of intervening endemic levels is in progress. This

has occurred at other periods in the past and, in particular, immediately prior to the pandemic of 1890, and does not therefore indicate a permanently favourable situation.

The mechanism of spread of influenza, though following the general method of airborne infection, is not finally settled. The reservoir of infection may be that of an apparently healthy herd, or by constant chain of transmission by actual cases of the disease from one country to another. Conditions within a group of individuals which favour the development of a particularly intense outbreak of influenza have not yet been defined.

A review of the present status of methods of sterilizing the air, and of diminishing dust contamination suggests that though something can be achieved in regard to a lessening of the level of endemic respiratory tract infection, less success is attained during sharp outbreaks. The reasons for this lack of success are not apparent and further research into fundamental aspects of airborne infection is needed. There is no firm foundation at present for the adoption of particular methods aimed at the control of bacterial or virus contamination of the air or dust unless direct contact infection can also be minimized.

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MAY I INTRODUCE STATISTICS ?

BY

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PART I

INTRODUCTION

THE purpose of this paper is to explain the terms commonly used in statistical analysis and to indicate the application of the simpler statistical methods.

Many impolite remarks have been passed, are being passed, and will, no doubt, continue to be passed regarding statistics and statisticians. Some of them are true and a few of them are trite. The expression most frequently used is probably to the effect that "figures can be made to prove anything."

Figures can prove many things ; for example, if you are endeavouring to complete a journey at the average speed of 30 miles per hour and you accomplish the first half of it with an average of 15 m.p.h., nothing less than a magic carpet will be necessary for the rest of the journey. That may appear incredible at first sight ; that it is true is due to the fact that you have used for the first half of the trip the time you had allowed for the whole journey. I can remember, also, when two members of a cricket club were running neck and neck to top the bowling averages for the season. With one match to go both had the same average ; the fast bowler had already taken 100 wickets for 1,000 runs and the slow bowler 10 for 100 ; in the last match the fast bowler took five for five and the slow bowler five for twenty. Consternation is the mildest term for the emotion which was experienced by the former when he discovered that his labours had resulted in his having a final average of 9.57 whereas his rival ended up with an average of 8. The injustice is only apparent, however, as, although both had improved their averages, the slow bowler had done so to a greater extent relatively to the number of wickets and runs he had already taken and conceded. Had the last day's performances been spread over the whole season, not even an apparent injustice would have been suggested. Batting and bowling averages are not always what they seem ! What I like to believe is that the expression "figures can be made to prove anything" originated at about the same time as "the exception proves the rule" ; at the time, in fact, when the word "prove" had not lost its relationship with the original "probe." I think we

can agree that the exception probes the rule and that figures can probe anything.

Those who sheer away from the subject of statistical methods (those, in fact, who make the rude remarks) are usually frightened either by the mathematics involved, the technical expressions encountered, or by the Greek symbols employed. In practice the mathematics is not difficult, the expressions used are mostly self-explanatory, and the symbolism easily understood where it cannot be entirely eliminated. The faint-hearted, however, may prefer to omit, on first reading it at least, that part of the paper which is printed in small type. This can be done without disturbing the sequence of the remainder.

One fact which must be understood at the outset is that, no matter what figures can be made to do, *statistical methods can prove nothing*. They are merely tools in the hands of the research worker by means of which he is enabled to describe, relate and assess the value of his observations. They can be used and they can be abused. What is of importance is that those who read original work in which figures are used by the writer should be able to judge whether he has in fact used them or abused them.

The term "statistical significance" is not an absolute one. It is based on probability. If there are three horses in a race, each of which is considered by the bookmaker to have an equal chance of winning he will (if he is not interested in profit!) open his book by offering two to one against each of the runners. By two to one he means that he considers a horse to have one chance in three of winning; this may be expressed as a probability of $\frac{1}{3}$; each horse has an equal chance in this case, and $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1$. It is always the case that probabilities expressed in this way do add up to 1 provided that all probabilities are included. If you throw a die, your chance of throwing a 6 is $1/6$, and your chance of throwing something else is $5/6$; $1/6$ and $5/6$ again making 1. Your chance of throwing a 5 or a 6 is $1/6 + 1/6 = \frac{1}{3}$; your chance of throwing anything else is $4/6$ or $2/3$ and again $\frac{1}{3} + 2/3 = 1$. Here has been used the constant rule that the probability of *either* one thing happening *or* another is found by *adding* together the probabilities of each. On the other hand your chance of throwing two sixes with two dice is $1/6 \times 1/6 = 1/36$. In other words the odds are 35 to 1 against. Here the rule is that the probability of one thing happening *as well as* another is found by *multiplying* the individual probabilities. To extend this, the odds against your throwing three sixes with three dice are 215 to 1 ($1/6 \times 1/6 \times 1/6 = 1/216$). In other words the chance is so small that one might consider the throw to be significant. If you performed the feat several times it would be so significant that you might be accused of using loaded dice. Nevertheless proof would be lacking, because the "probability," no matter how small, would still exist. Similarly with what is called statistical significance; when the result of an experiment is said to be statistically significant all that is meant is that the probability of such a result having been obtained by chance is extremely small; how small depends upon the rigour of the standard which has been adopted. One of the reasons why statistical signifi-

cance can never be regarded as proof is that one is nearly always working, not with the population as a whole, but with a sample of that population. Obviously the value placed upon the results of an experiment depends largely on the size of the sample and on the extent to which it is representative of the population. If you took ten women at random and found that all the blondes were blue-eyed and all the brunettes brown-eyed you might be interested but not significantly impressed. If you increased your sample tenfold and found the same result you might begin to think there was a definite relationship between fair hair and blue eyes on the one hand and dark hair and brown eyes on the other. No matter how big your sample, however, you could never be *absolutely sure* that the next blonde you came across would have blue eyes.

AVERAGES

The best known and most useful form of average is the *arithmetic mean*, usually called the "mean" or "average," so that when the word "average" is used, the arithmetic mean is usually intended. The mean of a number of observations is, of course, normally found by adding all the observations and dividing the total by the number of observations. When the number of observations is large, however, this would be a laborious operation, and the usual method is simplified by the construction of a *frequency distribution table* (Table I).

TABLE I.—FREQUENCY DISTRIBUTION TABLE SHOWING THE NUMBERS OF COLDS SUFFERED BY EACH OF 814 INDIVIDUALS IN THE COURSE OF ONE YEAR

No. of colds	No. of individuals
0	14
1	173
2	247
3	233
4	112
5	23
6	12
7+	0
	—
Total	814

Instead of adding together 814 separate figures the same result is obtained by multiplying each figure in the first column of the table by its corresponding figure in the second column and adding the results. Thus the total number of colds is :

$(0 \times 14) + (1 \times 173) + (2 \times 247) + (3 \times 233) + (4 \times 112) + (5 \times 23) + (6 \times 12) = 0 + 173 + 494 + 699 + 448 + 115 + 72 = 2001$, and the mean number of colds suffered by the 814 individuals of course is $2001/814 = 2.46$.

In the above example the values of one's observations were anything from 0 to 6. This method would, however, still be laborious if there were many possible values of one's observations. In such a case one's findings are usually

tabulated in the form of a *grouped frequency distribution table* and the mean can be determined by a modification of the method used above (Table II).

TABLE II.—GROUPED FREQUENCY DISTRIBUTION TABLE SHOWING THE SYSTOLIC BLOOD PRESSURE OF 222 HEALTHY ADULTS AND THE METHOD OF CALCULATING THE MEAN

<i>I</i> <i>Systolic B.P.</i>	<i>II</i> <i>Frequency</i>	<i>III</i> <i>Group No.</i>	<i>IV</i> <i>II × III</i>
95–99	2	–7	–14
100–104	4	–6	–24
105–109	7	–5	–35
110–114	12	–4	–48
115–119	19	–3	–57
120–124	24	–2	–48
125–129	27	–1	–27
<hr/>			
130–134	35	0	–253
<hr/>			
135–139	26	1	26
140–144	21	2	42
145–149	18	3	54
150–154	13	4	52
155–159	6	5	30
160–164	5	6	30
165–169	2	7	14
170–174	1	8	8
<hr/>			
	222		256
			–253
<hr/>			
			3

The first two columns form an example of a grouped frequency distribution table. To calculate the mean, an arbitrary origin, or starting point, is selected, usually the centre point of one of the groups towards the middle of the table. In the example 132 has been chosen as the starting point (all observations between 129.5 and 134.5 will be included in the 130–134 group). A third column is then added, numbering the 130–134 group (i.e. that including the starting point) zero, the higher groups 1, 2, 3, etc., and the lower groups –1, –2, –3, etc. Column 1 can now be ignored, and a fourth column is formed by multiplying the figures in columns II and III. When the figures in column IV are added, making due allowance for + and – signs, the total, in this case 3, divided by the number of observations, 222, gives the discrepancy in “working units” of the arbitrary origin or starting point from the true mean. The “working unit” is the number of units included in each group, in this case 5. Thus :

$$\text{Discrepancy in working units} = \frac{3}{222} = 0.0135$$

$$\text{Size of working unit} = 5$$

$$\text{Arbitrary origin or starting point} = 132$$

$$\begin{aligned} \text{Therefore, the true arithmetic mean} &= 132 + 0.0135 \times 5 \\ &= 132 + 0.0675 \\ &= 132.0675 \end{aligned}$$

(N.B.—If the sum of column IV had been negative, the discrepancy would have been subtracted from the starting point instead of having being added to it ; e.g. if the total of column IV had been –9, the other values remaining the same, then :

$$\text{Discrepancy in working units} = -\frac{9}{222} = -0.0405$$

$$\text{Size of working units} = 5$$

$$\text{Arbitrary origin or starting point} = 132$$

$$\begin{aligned}\text{Therefore, the true arithmetic mean} &= 132 - 0.0405 \times 5 \\ &= 132 - 0.2025 \\ &= 131.7975\end{aligned}$$

It will be realized that the above method is completely accurate only if the mean of all the readings in each group is coincident with the central point of the group. This is an acceptable assumption which becomes more and more nearly true as the number of observations increases.

Another form of average which is sometimes used is called the *median*. This, as its name implies, is the central observation when all the observations are arranged in order of magnitude. Thus, if there are twenty-one men on parade and they are "sized" in one rank in order of height, then the height of the middle man, i.e. the eleventh from either end, will be the median height of all those on parade. The essential point about the median is that there are an equal number of observations on each side of it. If there are an even number of observations then the median is taken as the mean of the two central observations. Thus, if there had been twenty-two men on parade, the eleventh and twelfth men would have been equally central and the mean of their two heights would have given the median. It will be seen that there would still have been the same number of observations, viz. 11, on either side of the median.

To find the median in a grouped frequency distribution requires but a modicum of common sense and the acceptance of the assumption already suggested, that the observations in any one group are evenly distributed throughout that group. Reverting to Table II, it is obvious that the median observation of the 222 is the mean of the one hundred and eleventh and the one hundred and twelfth observations. (There would then be 111 observations on each side.) There are 95 observations in the first seven groups and 35 in the eighth group (130-134). It is therefore obvious that the hundred and eleventh and the hundred and twelfth observations must lie in that group. The question is where? The answer is that the two required observations will be the sixteenth and seventeenth in that group ($111-95 = 16$, and $112-95 = 17$). If we may assume that the observations in that group are evenly distributed then the required observations will be $129.5 + 16/35$ of 5 and $129.5 + 17/35$ of 5. (In other words, the lower limit of the group plus $16/35$ and $17/35$ of the size of the group, there being 35 observations in the group.) Accordingly the median is the mean of $129.5 + 80/35$ and $129.5 + 85/35$, i.e. the mean of 131.79 and 131.91, i.e. 131.85.

A form of average which is occasionally used is the *mode*. This, as its name suggests, is the most fashionable or most frequently occurring, observation. In Table I, for example, the mode is 2, as more individuals suffered two colds than any other number. The mode, however, can rarely be determined accurately by the study of numerical data as errors in sampling or the small size of the sample may easily result in an observation occurring most frequently which differs considerably from that of the population as a whole.

If a graph of the frequency of any variable for the total population were drawn, the highest point of the curve would represent the mode, since the maximum frequency would occur at that point. It has been found that, in curves

which are not greatly asymmetrical, it is better not to rely on the most frequently occurring observation but to determine the mode by applying the following formula :

$$\text{Mode} = \text{mean} - 3 (\text{mean} - \text{median})$$

In distributions which are perfectly symmetrical the mean and median are equal ; the mode will then equal the mean $- 3 \times 0$; in other words the mean, median and mode will all be equal.

The median and mode are less valuable as averages than the mean and are much less commonly used. Their most obvious use is where the mean would give a false picture by reason of there being one or two exceptional outlying observations in a series which is otherwise fairly uniform.

E.g. the inhabitants of a village might consist of twenty cottagers earning £300 each year, and a squire with an income of £3,000. To say that the average income of the inhabitants was in the neighbourhood of £430 would obviously be a distortion of the true state of affairs (although the mean in fact is over £428 10s.). On the other hand, the median and mode in this case would both be £300, a much more accurate figure.

THE MEASUREMENT OF SCATTER OR DISPERSION

Averages, which we have been considering so far, may be described as measurements of position. They fix the position around which the variables occur. They rarely, however, give a sufficiently adequate description of those variables. Suppose that the twenty-one soldiers whom we had on parade in the last section had a mean height of 5 ft. 8 in. ; they might nevertheless vary from 5 ft. 3 in. to 6 ft. 3 in. ; or, going towards the other extreme, they might all be between 5 ft. 7 in. and 5 ft. 9 in. To complete the picture, we must have some measures which will describe the *scatter*, as it is commonly called, of one's observations round the mean.

The range is the simplest measure of scatter or dispersion. Thus in the parade above-mentioned one could say the mean height of the soldiers was 5 ft. 8 in. with a range of 5 ft. 3 in. to 6 ft. 3 in., or, on the other hand, 5 ft. 8 in. with a range of 5 ft. 7 in. to 5 ft. 9 in. The range, however, is not a good measure of dispersion as it depends on only two of the observations, and these may easily mislead, one or both of them, for example, being exceptionally divorced from the rest. (Thus, in the parade above-mentioned the range might be 5 ft. 3 in. to 6 ft. 3 in. and yet all but the two extreme observations be within the range of 5 ft. 7 in. and 5 ft. 9 in.)

The inter-quartile range, as its name indicates, involves the division of the observations into quarters. This is accomplished by taking first the median of all observations, thus dividing them into two numerically equal halves, and then taking the median of those two resulting halves. The three resulting "medians" are termed "quartiles" and the inter-quartile range is the range between the upper and lower quartiles.

In its simplest form it can be applied to seven observations. If these are

arranged in order of magnitude, the median observation is, of course, the fourth. (There would then be three observations on each side.) Of each of these groups of three observations the median is the second, leaving one on each side, and the inter-quartile range the range between those two final medians, the upper and lower quartiles. Thus, one might apply the inter-quartile range to a series of seven observations of height in a sample, say, of children who are being investigated in a nutritional experiment. If their heights in inches were 42, 46, 47, 49, 50, 52 and 57, then the median observation would be 49, and the upper and lower quartiles 46 and 52; the inter-quartile range would be 6 inches. (N.B. that this expression of scatter avoids the exaggeration which would otherwise be suggested by the lowest and highest observations being far removed from their neighbour.)

In practice the inter-quartile range is usually halved, and quoted as the *semi-inter-quartile range*. In the last example this would, of course, be 3 inches. Although this measure is an improvement on the total range it is not amenable to further statistical treatment and is still liable to be anomalous.

A measure which uses all the observations is the *mean deviation*. This, as its name implies, is the mean amount by which all the observations deviate from their average. The median rather than the arithmetic mean is usually taken as the average for this purpose. In the last example the observations in inches were 42, 46, 47, 49, 50, 52 and 57. Of these the median observation is 49. The deviations of each observation from 49 are 7, 3, 2, 0, 1, 3 and 8. The mean deviation is, then, the sum of these deviations, 24, divided by their number, 7. The mean deviation is, accordingly, $24/7 = 3.43$.

The Standard Deviation.—This is the most useful of all measures of scatter and is, in words, the square root of the mean of all squared deviations of observations from their mean. The symbol usually employed to represent the standard deviation is the Greek letter σ (sigma). The abbreviation S.D. may be used instead. In our last example the observations were 42, 46, 47, 49, 50, 52 and 57.

Mean = sum of observations divided by their number

$$= (42 + 46 + 47 + 49 + 50 + 52 + 57)/7$$

$$= 343/7$$

$$= 49$$

Deviations from the mean = -7, -3, -2, 0 + 1 + 3 and + 8

Squared deviations = 49, 9, 4, 0, 1, 9 and 64

Mean of squared deviations = $(49 + 9 + 4 + 0 + 1 + 9 + 64)/7$

$$= 136/7$$

$$= 19.43$$

Standard deviation = $\sqrt{19.43}$

$$= \sqrt{4.41}$$

That method of calculating the S.D. is simple when the mean, as in the above example, is a whole number. This, naturally, is not usually the case. As a rule, therefore, the deviations are not whole numbers and squaring them would be laborious. However, it can be shown mathematically that the S.D. can be obtained equally well by finding the

square root of (mean of the squared observations minus the square of their mean). To demonstrate the truth of this, let us apply it to the same example (Table III).

TABLE III

Observations	Squared observations
42	1764
46	2116
47	2209
49	2401
50	2500
52	2704
57	3249
<hr/> 343	<hr/> 16943

Then :

Mean of squared observations = their sum divided by their number
 $= 16943/7$
 $= 2420.43$

Mean of observations $= 343/7$
 $= 49$

Squared mean of observations $= 2401$

Therefore, S.D. $= \sqrt{2420.43 - 2401}$
 $= \sqrt{19.43}$
 $= 4.41$

The same result as was obtained before.

The above calculation can be expressed in the shape of a formula :

$$\text{S.D.} = \sqrt{\frac{S(X^2)}{N} - \bar{X}^2}$$

where $S(X^2)$ means the sum of the squared observations,

N is the number of observations,

and \bar{X} is the mean of the observations.

In order to calculate the S.D. from a frequency distribution table, the formula is modified thus :

$$\text{S.D.} = \sqrt{\frac{S(fX^2)}{N} - \left(\frac{S(fX)}{N}\right)^2}$$

Where f is the frequency with which each value of X occurs.

The use of this formula is shown in the following example, in which the standard deviation is found of the observations in Table I.

No. of colds	Frequency	fX	fX^2
\times	f	$(f \times X)$	$(fX \times X)$
0	14	0	0
1	173	173	173
2	247	494	988
3	233	699	2,097
4	112	448	1,792
5	23	115	575
6	12	72	432
7+	0	0	0
	<hr/> 814	<hr/> 2,001	<hr/> 6,057

$$\begin{aligned}
 \text{Then S.D.} &= \sqrt{\frac{S(fX^2)}{N} - \left(\frac{S(fX)}{N}\right)^2} \\
 &= \sqrt{\frac{6057}{814} - \left(\frac{2001}{814}\right)^2} \\
 &= \sqrt{7.441 - 6.043} \\
 &= \sqrt{1.398} \\
 &= 1.182
 \end{aligned}$$

In a grouped frequency distribution table the standard deviation can be found from the modified formula. As an example, Table II is reproduced with one additional column (Table IV).

TABLE IV

<i>I</i> Systolic B.P.	<i>II</i> Frequency <i>f</i>	<i>III</i> Group No. <i>X</i>	<i>IV</i> <i>fX</i> (<i>f</i> × <i>X</i>)	<i>V</i> <i>fX</i> ² (<i>fX</i> × <i>X</i>)
95-99	2	-7	-14	98
100-104	4	-6	-24	144
105-109	7	-5	-35	175
110-114	12	-4	-48	192
115-119	19	-3	-57	171
120-124	24	-2	-48	96
125-129	27	-1	-27	27
130-134	35	0	-253	0
135-139	26	1	26	26
140-144	21	2	42	84
145-149	18	3	54	162
150-154	13	4	52	208
155-159	6	5	30	150
160-164	5	6	30	180
165-169	2	7	14	98
170-174	1	8	8	64
	222		256	1,875
			- 253	
			3	

Then, by the modified formula :

$$\begin{aligned}
 \text{S.D. in "working units"} &= \sqrt{\frac{S(fX^2)}{N} - \left(\frac{S(fX)}{N}\right)^2} \\
 &= \sqrt{\frac{1875}{222} - \left(\frac{3}{222}\right)^2} \\
 &= \sqrt{8.4457} \\
 &= 2.906
 \end{aligned}$$

and since the working unit in this case is a group of 5 actual units, then S.D. in actual units is $2.906 \times 5 = 14.53$.

THE COEFFICIENT OF VARIATION

It should be noted that the scatter of one set of variables cannot be directly compared with the scatter of another set unless the mean of each is the same. Thus, the length of needles and of ninepins may be equally variable, but that would not be apparent by comparing their standard deviations expressed, say, in centimetres. Scatter can be compared, however, by expressing the standard deviation as a percentage ratio of the mean, thus :

$$V, \text{ (the coefficient of variation), } = \frac{\text{S.D.} \times 100}{\text{mean}}$$

In this way the units of measurement are eliminated, as they occur both in the numerator and the denominator, and V becomes a ratio independent of these units.

For example let us compare the relative variability of the data in Tables II and III.

$$\begin{aligned} \text{For Table II :} \quad & \text{Mean} = 132.0675 \text{ (see p. 268)} \\ & \text{S.D.} = 14.53 \text{ (see p. 271)} \\ \text{and } V &= \frac{14.53 \times 100}{132.0675} \\ &= 11 \end{aligned}$$

$$\begin{aligned} \text{For Table III :} \quad & \text{Mean} = 49 \text{ (see p. 268)} \\ & \text{S.D.} = 4.41 \text{ (see p. 271)} \\ \text{and } V &= \frac{4.41 \times 100}{49} \\ &= 9 \end{aligned}$$

In effect, this means that the observations in Table II are about 1.2 times as scattered around their mean as are the observations in Table III.

THE NORMAL DISTRIBUTION

Much statistical theory and method depend upon the fact that variables subjected to the many uncontrollable causes which are collectively called chance form a frequency distribution which can be depicted graphically in the form of a curve and that many biological observations have what is known as a "normal" distribution and may be represented by a "normal" or Gaussian symmetrical curve. This is most easily explained by an example. Accordingly, in fig. 1 there is represented a histogram of the grouped frequency distribution of the systolic blood pressures we have already considered in Table II.

If the size of each group had been made infinitely small and the number of observations sufficiently large, the histogram would have resolved itself into a symmetrical curve as shown in fig. 2.

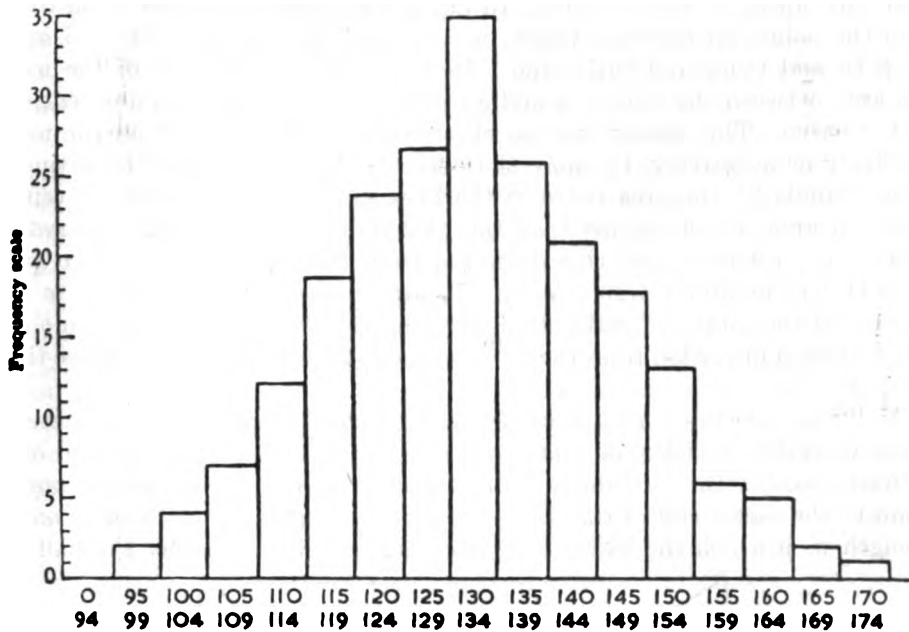


FIG. 1.—Histogram of frequency distribution of systolic blood pressure.

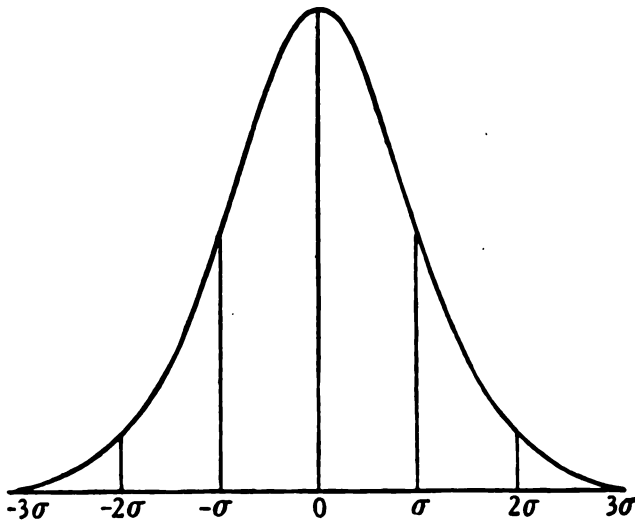


FIG. 2.

In a symmetrical distribution, as we have seen, the mean, mode and median are coincident and they are represented in the figure by the central line which divides the area contained by the curve into two equal parts. The area contained by any two uprights from the base to the curve represents the proportion of the total observations which fall between the two points on the base from which

these two uprights were erected. In fig. 2 additional lines have been drawn from the points on the base where, in a normal distribution, plus and minus the S.D. and twice and thrice the S.D. would lie on each side of the mean. The area between the lines $-\sigma$ and σ is 68 per cent of the total area enclosed by the curve. This means that an observation which differs from the mean, positively or negatively, by more than the S.D. will occur about one time in three. Similarly, the area between the lines -2σ and 2σ is 95 per cent of the total area, which means that the probability of any single observation showing a positive or negative deviation from the mean of more than twice the S.D. will be about $1/20$. Again, the area between -3σ and 3σ is 99.7 per cent of the total, indicating that only one in some 370 times will an observation show a deviation from the mean of more than plus or minus three times the S.D.

You may remember a game known as Corinthian bagatelle, the predecessor of the pin-tables which now adorn the saloon bar, and which consisted of an inclined board with a number of pins inserted into it; the player propelled a ball to the raised end of the board, and, depending to a small extent on the strength with which the ball was struck, but mostly on whether the ball was

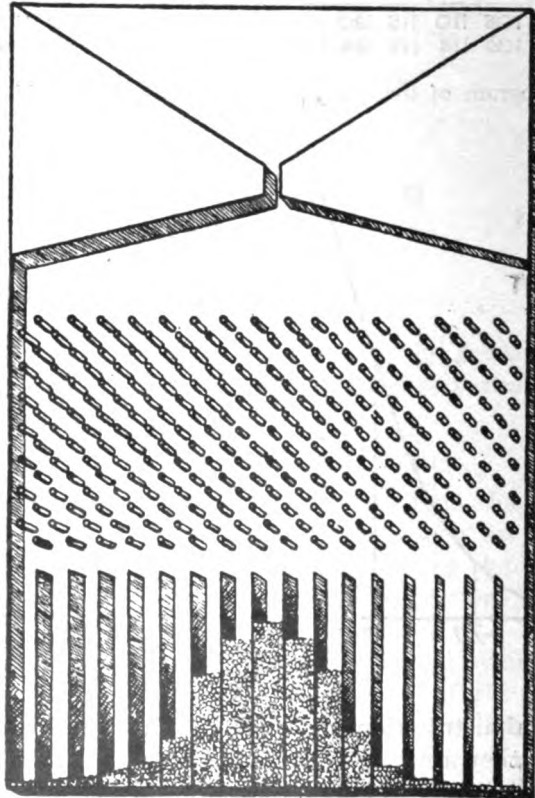


FIG. 3.

diverted to right or left by each successive pin that impeded its progress, the ball eventually came to rest in a particular part of the board marked 5, 10, 20, or 50, and so on. (We will discount for the moment the skill with which the more experienced player could influence the ball's destiny by a judicious nudge of the table when his opponent wasn't looking.) *Galton's Quincunx* is an apparatus of a similar nature, devised, however, to eliminate the influence of the player's skill, and in which the pins are symmetrically placed, each making equilateral triangles with its nearest neighbours (fig. 3).

It will be seen that—

“ The ball no question makes of ayes or noes
But right or left goes ”

depending entirely upon how it is diverted by the successive pins which it strikes. In other words, there is no influence here other than chance.

If a sufficient number of balls were used the final result would represent a histogram of a normal distribution. If the number of balls were infinitely large and their size and the size of the bays infinitely small the final result would be a representation of the normal or Gaussian curve.

The conception of *statistical significance* is based on the foregoing. As has already been pointed out the term significance is used to indicate that the odds are heavy against a certain estimate, difference, or coefficient deviating so much from its expected value by chance. In most cases the odds of 19 to 1 against are usually accepted as the lower limit of significance, i.e. a probability of $1/20$. This corresponds, as was seen above, to the chance of getting a deviation from the mean of a normal distribution greater than plus or minus twice the standard deviation.

(To be concluded)

A FEW ELEMENTARY ASPECTS OF ABORTION

BY

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UNTIL some years ago a distinction was made between the two terms "Abortion" and "Miscarriage," the former being employed when the ovum was expelled before the sixteenth week, and the latter where it was expelled between the sixteenth and twenty-eighth week. This distinction has now been given up and the term abortion is used generally, except by the lay public who still prefer "Miscarriage" or "Mishap."

Abortion then is defined as an expulsion of the ovum before the viable age, i.e. twenty-eight weeks. Where the foetus is expelled after this time, but before full term, this is known as premature labour.

FREQUENCY

It is impossible to estimate accurately the occurrence of abortion, as a very large number of early abortions go unrecognized by the patient or the doctor, being considered as a delayed menstrual period, but it is generally thought that about one in every five to eight pregnancies end in abortion.

ÆTIOLOGY

Extremely early abortions are for the most part due to the unsatisfactory embedding of the ovum which may be due to faults in the endometrium or the ovum. It is thought that the endometrium is sometimes at fault because of disease, and also that it is not exactly in the most suitable condition as regards the menstrual cycle for a satisfactory embedding.

Repeated coitus should be considered as an important factor in young married women. The unsatisfactory embedding may also be due to faults in the fertilized ovum and trophoblast, resulting in the early death of the ovum.

The causes which produce the ordinary abortions met with in practice are as follows :

(a) *Poisons*.—Excluding very early abortions, toxæmia associated with faulty metabolism and excretion occurs very much earlier than is generally supposed, and is thought to be one of the commonest causes of abortion. Less common are syphilis and the metallic poisons such as lead and mercury.

(b) *Diseases of the Reproductive System*.—The most important local lesions in the reproductive organs are endometritis, and metritis, fibroid tumours and retroversion of the uterus. Endometritis and metritis favour abortion because the inflammatory condition of the uterine wall interferes with the embedding and growth of the ovum. Retroversion also causes congestion of the uterus.

(c) *Diseases of Systems other than the Reproductive One.*—(i) Of these the most important are disorders of the excretory and digestive systems, dysentery, enteritis, etc.

(ii) Disturbances in the nervous system, such as a severe fright or extreme emotion, or graver diseases may be causation factors.

(iii) Of the vascular and respiratory systems, chronic valvular disease, chronic bronchitis, etc., may favour abortion.

(iv) Virus diseases, measles especially, is now thought to be a contributory cause.

(d) *Diet Deficiency.*—Experimental work upon the effect of dietary factors in the causation of sterility, and the discovery of the reproductive vitamin E by Evans have suggested that defective diet may so affect the vitality of the germ cells that the ovum may die at an early stage of development.

(e) *Endocrine Disturbances.*—The majority of these cases are probably accounted for under one of the headings : Genetic or Endocrine.

How important the genetic factor may be is difficult to say. That it plays a part in the ætiology of the condition is certain. For instance it is known that the instance of male fœtuses aborted is appreciably higher than that of female fœtuses. In some cases there seems to be a genetic incompatibility between paternal and maternal chromosomes, for it is not uncommon to find a woman who has had children by one husband but who habitually aborts with another. The endocrine factor is a deficiency of progesterone secretion. At a variable time after nidation of the ovum the chorionic villi take over the elaboration of progesterone, and the corpus luteum of pregnancy gradually fades away ; usually this change over is smoothly accomplished, but it may on occasions lead to a temporary deficiency of progesterone secretion.

(f) *Accidents, Falls and Injuries.*—Accidents, falls, and even minor injuries may be sufficient to cause abortion.

(g) *Criminal Abortion.*—An interesting article appeared in the *Lancet* some time ago dealing with the many and assorted methods used for criminal abortion. In the article it was stated that some 110,000 to 150,000 abortions take place every year in England and Wales, and probably at least 40 per cent of these are induced unlawfully and without proper medical indication. The incidence is difficult to assess owing to the natural reticence of both women and doctors to report such matters, when they have no duty to do so and can see no advantage in it, but if this conservative figure is accepted, it follows that there are 300 to 400 criminal abortions in England and Wales every day.

It goes on to say that apart from the substantial loss to the population, there is far more grave and lasting harm to fertile women.

The premature termination of a pregnancy can cause infinitely more lasting harm than can birth at, or near, term for it takes place without the advantage of choice of place or time and it lacks skilled attention, surgical cleanliness, and after-care. Only too often it is casual, or planned for mere domestic convenience and carried out in secrecy, for gain, by persons uninterested in the ultimate health of the wretched subject.

SYMPTOMS AND TREATMENT OF THE DIFFERENT VARIETIES OF ABORTION

Abortion usually occurs in the second or third month and is more prone to happen at a time that would have been a menstrual period had no pregnancy existed.

A periodic disturbance is said to exist even during pregnancy. There are three main symptoms of Abortion :

- (a) Pain. (b) Hæmorrhage. (c) Dilatation of the cervix.

The pain varies in severity with the duration of the pregnancy, for instance in early pregnancies it may be very slight, but in some cases it is severe, and generally succeeds the second symptom—hæmorrhage, which is due to the detachment of the ovum. The amount of hæmorrhage also may vary considerably and in many cases it may be extreme, the patient becoming blanched from loss of blood, and it is accompanied by the usual signs of shock.

The dilatation of the cervix occurs sooner or later if the ovum is expelled, but if the ovum is retained in the uterus practically no dilatation occurs.

In the early months of pregnancy the whole ovum may be expelled intact but, owing to the fact that at this stage fusion between the decidua reflexa or capsularis and the decidua vera is not complete, it often happens that the ovum with its villi is expelled and the decidua vera left behind. Later, after fusion of the layers of the decidua the whole mass may be expelled intact, although quite frequently this is not the case. When abortion occurs after formation of the placenta, the membranes rupture and the fœtus is expelled followed occasionally by the placenta. More commonly, however, the placenta is retained in whole, or part, and has to be removed manually.

CLASSIFICATION OF THE VARIETIES OF ABORTION

- (1) Threatened Abortion.
- (2) Inevitable—(a) Complete. (b) Incomplete. (c) Missed.
- (3) Tubal Abortion.

Threatened Abortion

Sometimes pain and hæmorrhage occur during early pregnancy without leading to dilatation of the cervix. Care should be taken in not attributing these symptoms in all cases to threatened abortion, as they might quite easily result from a number of other causes, for instance : Cervical polypus or malignant growths, and even where the bleeding can easily be traced to the uterine cavity it does not always mean that abortion will ensue, as a good deal of hæmorrhage can occur in early pregnancy without causing detachment of the ovum.

In practice it is not always easy to decide in the early stages whether a case of abortion is threatened or inevitable, but I am of the opinion that provided there is little or no dilatation of the cervix and the hæmorrhage is not severe, expectant treatment is the correct procedure.

In the *B.M.J.* of April 10, 1948, an article appeared by Bender of Liverpool on The Guterman Test in threatened abortion. In this article he stated " In a recent paper experimental work was reviewed which suggested that the

administration of progesterone in the treatment of threatened abortion is indicated where there is a natural deficiency of the hormone but that its use in the absence of progesterone deficiency is not only pointless but possibly increases the chances of the abortion progressing. This is because one of the actions of the hormone is to increase the amplitude of uterine contractions.

Accordingly before starting therapy in these cases, it is desirable to divide them into two categories. Those accompanied by progesterone deficiency and those not so accompanied. This differentiation can be made by estimating the level of urinary pregnanediol excretion, which level is held to provide a reliable index of progesterone metabolism.

"The Guterman (pregnanediol excretion) test, although less exact than lengthier methods of pregnanediol assay, has been found eminently suitable for this purpose."

He goes on to say that investigations of 100 cases diagnosed clinically as threatened abortion were made by means of the Guterman test. In 75 the clinical diagnosis was correct. In the remainder a comparison of the results of simultaneously performed Guterman and Aschheim-Zondek tests made or confirmed the correct diagnosis. The Guterman test, although not as exact as lengthier methods, is said to be accurate enough to differentiate those cases of true threatened abortion which are associated with evidence of progesterone failure from those which are not. In the former case good results can be expected from progesterone therapy, while in the latter type such treatment may accelerate the course of abortion.

The results of this investigation suggest that the abortion rate in cases of threatened abortion where the fœtus is still alive can be reduced by about 25 per cent by selecting for progesterone therapy only those cases in which the Guterman test is negative or weakly positive.

Inevitable Abortion

(a) *Complete*.—When the pains are regular and intermittent and the internal os is open, with the ovum detached and lying in the cervix and the liquor amnii has escaped, the abortion is said to be inevitable.

It is sometimes possible to recognize uterine contractions by palpation and this forms a useful sign, for in threatened abortion the uterus does not contract sufficiently to be recognizable.

(b) *Incomplete*.—This term implies that some portion of the placenta or decidua has been retained in the uterus. Continuance of bleeding, which in some cases may be very severe, and also absence of the expected involution of the uterus are the main symptoms, to these may be added sepsis, if the cavity of the uterus has not been kept sterile.

(c) *Missed*.—In cases of missed abortion the ovum dies and is retained in the uterus. Occasionally this is preceded by the symptoms of a threatened abortion. The ovum may be retained for many months, or on the other hand it may not be expelled until what would have been "full time" had pregnancy

run a normal course. The ovum presents a very typical appearance and it is known as a carneous, or fleshy mole. Numerous hæmorrhages occur into the decidua and chorium, and these raise the amnion in an irregular manner, hence the terms applied to the condition.

In the amnionic cavity the minute embryo may be observed but in many cases it has entirely disappeared.

The diagnosis of "missed abortion" is often very difficult and in many cases can only be reached by waiting and observing the patient. If the uterus remains the same size and the subjective symptoms of pregnancy disappear, then it may be concluded that the ovum is dead. Following the death of the ovum the breasts tend to become more relaxed. If the uterus continues to increase in size it is probable that the ovum is alive and that the pregnancy is continuing normally.

Tubal Abortion

(a) *Before Rupture.*—As this condition usually occurs very early, there are practically no signs or symptoms. Amenorrhœa will probably be present but on the other hand a blood-stained discharge sometimes appears and can be mistaken for a delayed period. Pain is generally present in the lower abdomen, and on vaginal examination the uterus may appear to be slightly enlarged. In some cases the enlarged tube may be palpated.

(b) *After Rupture.*—The patient complains of a sudden acute pain in the lower abdomen. If the hæmorrhage is severe there will be dullness in the iliac fossa and general rigidity of the abdomen with a limitation of movement on respiration. Faintness and vomiting, with a subnormal temperature and rapid pulse will also be present. Examination *per vagina* will reveal a slight hæmorrhage and great pain will be experienced by the patient, especially when the vaginal fornices are examined. A doughy mass may be felt in the posterior fornix and the cervix will be softened and the uterus enlarged.

DIFFERENTIAL DIAGNOSIS

There are two other conditions which resemble abortion inasmuch as they are characterized by the expulsion of a body from the uterus with hæmorrhage and pain; they are: (1) Tubal gestation and (2) intra-uterine polypus.

(1) The structure of the decidual membrane is identical in both uterine and extra-uterine pregnancy and therefore uterine abortion cannot be diagnosed unless structures recognizable as chorionic or foetal have been expelled from the uterus. An important clinical distinction is, that in abortion pain is slight and hæmorrhage severe, whereas in tubal gestation pain is very severe and hæmorrhage slight.

(2) An intra-uterine polypus sometimes protrudes through the cervix. Pain, hæmorrhage, enlargement of the uterus, dilatation of the internal os with a soft bulging swelling in the cervical canal could easily be mistaken for an inevitable abortion. The usual signs and symptoms of pregnancy would, however, be absent, and there would in all probability be no history of amenorrhœa.

TREATMENT

Prophylactic treatment is of great importance. An effort should therefore be made in all cases to try and discover the cause of an abortion, this is especially so in cases of habitual abortion. The urine should be examined. The blood pressure taken, a Wassermann test applied and a thorough clinical examination of the patient should be undertaken including a pelvic examination after the patient has recovered from an abortion. In cases of habitual abortion particular attention should be paid to the patient's diet (deficiency of vitamin E).

The husband should be examined, to ascertain whether there is any evidence of defective spermatogenesis, if present it should be treated not only by attention to the general health and hygiene but by the administration of testicular and gonadotrophic hormones and vitamin E concentrate.

The patient should be told, that if she becomes pregnant she should report as early as possible for advice and treatment.

She should be given vitamin E and hormone treatment, of the latter, progesterone and gonadotrophic luteinizing hormone should be used. Should there be any suspicion of hypothyroidism, thyroid extract should be given in addition.

Careful management at the time when the menstrual period would normally become due is also essential and the patient should therefore be instructed to remain in bed for three or four days during this time. Cases of backward displacement of the uterus which are discovered after pregnancy has taken place should be left alone if unaccompanied by symptoms.

Threatened Abortion.—The patient should be confined to bed and all forms of exertion and excitement suppressed by the use of sedatives. A hypodermic injection of a quarter of a grain of morphia should be given and repeated at intervals if necessary.

Potassium bromide and chloral are also useful especially if the patient is of a nervous disposition.

Progesterone therapy.—I am of the opinion that progesterone therapy is worth a trial in all cases of threatened abortion. Injections of up to 10 mg. doses should be given daily until bleeding ceases or until the abortion becomes inevitable.

I have no statistics to show that this hormone is beneficial in these cases, but I have a general impression that more cases of threatened abortion go to term now than did before the arrival of this hormone on the market.

Inevitable Abortion.—In some cases this process will proceed naturally and terminate without any interference and with a favourable result.

No treatment is required beyond the administration of ergometrine to stimulate the uterus with a view to preventing retention of parts of the decidua or ovum and ensuring proper retraction afterwards.

It is very important that instructions are given to save all blood clot for inspection as the uterine contents may be discharged piecemeal.

If the hæmorrhage continues it will probably mean that some products of conception are retained and it will then be necessary to remove these in the most

conservative manner, the choice of procedure depending upon the consistency and degree of dilatation of the cervix. If it is sufficiently patulous to admit a finger, this should be introduced into the uterus and the ovum peeled off from the uterine wall and extracted. If this cannot be effected, the ovum should be broken up by the finger and extracted with a placental or ovum forceps.

If, however, the cervix is soft, but not sufficiently dilated to permit the introduction of a finger, dilatation may be effected by means of Hegar's dilators.

If the hæmorrhage persists after the uterus has been completely emptied of its contents, it may occasionally be necessary in the case of an emergency to plug the uterine cavity with a long piece of 1 inch or 2 inch sterile gauze. the vagina should be loosely plugged. Finally a small dose of ergometrine should be administered by intramuscular injection.

The gauze must be removed in twelve hours as there should be no further risk of hæmorrhage after that time.

Missed Abortion.—Once the diagnosis is established the cervix should be dilated and the uterine contents cleared out.

The alternative plan is to do nothing active but to await spontaneous expulsion of the mole which is bound to occur sooner or later; the disadvantages of this are that the patient is left in a state of uncertainty, and abortion of the mole may be accompanied by serious hæmorrhage.

Estrogen may be tried with a view to stimulating the uterine muscles to contract and expel the mole. Large doses should be given, 10–15 mg. of stilbæstrol every waking hour may be administered for three days, before it is abandoned in favour of a surgical evacuation of the uterus.

Tubal Abortion.—*Before Rupture*: Diagnosis in the early stages is extremely difficult but should it be confirmed, removal of the affected tube should be undertaken without delay.

After Rupture: Where there has been a severe intra-abdominal hæmorrhage it will probably be necessary to treat the patient for shock before taking her to the theatre, a careful watch must be kept on the pulse-rate to ascertain that no fresh hæmorrhage is occurring. It will almost certainly be necessary to transfuse the patient either during or after the operation. The operation consists of a laparotomy, the removal of the blood clot from the abdominal cavity and a resection of the affected tube.

Septic Abortion: In dealing with cases of septic abortion the uterus is always soft and friable, and if undue instrumental interference is undertaken it may very easily rupture.

If the os is sufficiently dilated, gentle exploration of the uterine cavity may be undertaken with an ovum forceps, but if it is possible to extract the uterine contents with a finger it is much safer to do so. It is essential that chemotherapy should be started as early as possible.

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***REPORT ON VENTILATION IN H.M.T. D.—**

January–February 1944

BY

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AND

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THE following report on air temperatures and conditions of ventilation in H.M.T. D.— during a voyage from temperate to tropical zones has been drawn up in accordance with instructions and requirements laid down in War Office letters 24/Gen/2417/Q(M)/1a, dated April 2, 1943, and September 14, 1943.

SCOPE OF INVESTIGATION

- (1) Preliminary enquiries and inspection of system of ventilation.
- (2) Observations of air temperature, cooling power, and air velocity.
- (3) Appendix “A.” Special report on certain quarters found to be defective.

(1) INSPECTION OF VENTILATION SYSTEMS

In the first instance, the S.M.O. and Troops Officer were contacted and information obtained from them as to the quarters in which the adequacy of ventilation was doubtful, and details obtained of the system of ventilation in various parts of the ship. A diagram was made of the quarters and a preliminary inspection carried out to determine (a) the general condition and use being made of the ventilating mechanisms, and (b) sites in quarters at which routine observations of air temperature, etc., should be made.

A detailed inspection of the system of ventilation was carried out, the following points being noted :

- (i) *The system of ventilation* comprised several different types of equipment, according to the date of installation and local requirements :
 - (a) Cowl ventilation supplying fresh air.
 - (b) Large power fans on Port and Starboard sides, supplying fresh air along trunking to quarters and corridors.

*Apart from minor corrections and the omission of diagrams of the ship's quarters, this paper is a reproduction of a report rendered to the O.C. Troops, H.M.T.D.—, by the ventilation officers appointed for the voyage. The report was prepared under extremely difficult conditions and the authors tender their apologies to readers for the literary style and many defects which would have been remedied had time permitted.

(c) Local power fans supplying fresh air through recently installed trunking fitted with “punkah louvre” delivery units.

(d) Local power fans delivering fresh air through trunking fitted with louvres of various types.

(e) Fans for re-circulating air in cabins in which there is no supply of fresh air when ports are closed as required during the hours of blackout.

(ii) *Cowl Ventilation and Extraction Vents.*—Certain cowl ventilators needed directional adjustment and the gridded vents on trunking connected with supply fans were in several cases partially blocked with rubbish and deposit adhering to the wire meshes. These defects were remedied and personnel detailed for the routine inspection and cleaning of supply and extraction vents.

(iii) *Power Fans and Trunking.*—Some fans could be operated at two speeds but the majority had only one speed. They were run at the maximum speed. The trunking of the power fans exposed on the Port and Starboard sides of “B” Deck Aft were defective in several places. Holes approximately 3 in. diameter were noted and in one place large quantities of air under high pressure were emerging from a hole 1 foot square, where the trunking from the port side fan linked up with the steam heater. Attention was drawn to this defect and steps taken to remedy it.

(iv) *Inspection Plates.*—Particularly in the case of the recently installed trunking for the punkah louvre system, it was noted that the inspection plates had been removed in several quarters, and, in one case, a plate 18 in. by 6 in. had been detached. Orders were issued that these plates were to be replaced at once and not interfered with. It was explained to the troops that removal of these plates reduces the force of the air jets from the louvres and stencilled “DO NOT TOUCH” notices were painted on the trunking.

(v) *Delivery Louvres.*—In many cases it was noted that the louvres were directing the air jets against individual hammocks or clothing or tables. It was pointed out that to get the best general advantage of this type of fresh air ventilation the air stream should be directed between tiers of bunks, or rows of hammocks, viz. down alleyways, towards the extractor of the cowl ventilator which in some cases was present, or the centre stairway in others. In some cases the louvres were so adjusted as to promote a circulation of air—see Appendix, quarters “D” 2. These louvres might be marked with a line painted on the trunking to indicate the setting and enable any alterations to be easily detected. Occupants of certain quarters were advised not to leave clothing drying at night as it both hindered the air stream and added humidity to the air.

(vi) *Cabin Fans.*—In cabins and quarters unventilated by fresh air, the need for increased cooling power of the air movement created by fans was particularly marked and with the reconditioning of certain fans and the installation of others, conditions were much improved. Although this was a help—the re-circulation of air without entry of fresh air is unsatisfactory as the humidity increases rapidly in occupied quarters.

***(2) OBSERVATIONS OF AIR TEMPERATURES, COOLING POWERS, AND AIR VELOCITY.**

Some Dry and Wet Bulb Temperatures were recorded by two Mason's Hygrometers issued for the purpose, but as these instruments take some minutes to reach stability on change of location, the vast majority of readings were taken by means of an Edney Swing Hygrometer.

Measurements of Cooling Power and Air Velocity were taken by means of a Kata thermometer.

Observations relevant to constructive criticisms of the ventilation conditions of certain quarters are given in Appendix "A."

APPENDIX "A." SPECIAL REPORT ON VENTILATION IN CERTAIN QUARTERS

The ventilation in the undermentioned quarters is defective in comparison with that appertaining generally. Our opinion in this respect is based on observations of air temperatures given in the schedule below, together with simultaneous observations of outside shade temperature, and records of the number of occupants, all of which information is required by W.O. letter 25/Gen/2417/Q(M)/1a dated September 14, 1943.

In regard to inlet cowls, in one instance only, viz. that of the Separation Ward, which is discussed at a later point, were the cowlings systems rendered ineffective during the voyage.

Fans were in continuous operation as soon as the need for them occurred during the voyage. Inspection plates in the trunking were found to have been removed and damaged in certain quarters but this matter was dealt with effectively before completion of the voyage by :

- i. Enforcing the replacement of the plates.
- ii. Stencilling the trunking near each plate with the words DO NOT TOUCH.
- iii. Warning troops, through S.R.O.s that interference with plates would be severely dealt with.

In regard to damaged plates and defects in the trunking system generally, the ship's staff undertook repairs as from time to time we reported them, after detection.

A diagram of the ship's quarters is given which should be consulted in conjunction with Appendix "A" tables for the following quarters :

- | | | |
|------------|-----------|---|
| Section 1. | "D" Deck. | "D" 2 quarters, 77 officers. |
| " 2. | "C" " | Various cabins. |
| " 3. | "B" " | Various dormitories and one troop deck. |
| " 4. | "C" " | Island Aft : Separation Ward. |
| " 5. | "L" " | Stewards' quarters. |

We wish to draw attention to the following factors influencing the effectiveness of the system of ventilation installed, assuming that the fresh air provision, by means of the

*Instructions for the use of instruments and procedure recommended for the investigation of ventilation and thermal comfort conditions in ships are given in: Medical Research Council War Memorandum No. 17, "Environmental Warmth and Its Measurement," by T. Bedford, H.M.S.O. 1946.

Recent studies bearing on problems of thermal comfort in ships are referred to in the following paper: "A Survey of Physiological Studies of Mental and Physical Work in Hot and Humid Environments," by G. P. Crowden, Transactions of the Royal Society of Tropical Medicine and Hygiene, Vol. 42, No. 4, January 1949.

APPENDIX "A." SUMMARY OF OBSERVATIONS TAKEN IN DEFECTIVE SPACES, H.M.T. D.—

Date	Time	Location	°F. D.B.	°F. W.B.	% R.H.	Remarks
SECTION 1 D.2. 77 OFFICERS						
28 Jan. 44	0700	D2. Fully occupied, ports closed	74	73	95	
28 Jan. 44	2330	D2. Fully occupied, ports closed	78	68	58	
28 Jan. 44	2330	Punkah louvre air entry ..	70	64	71	
28 Jan. 44	2330	D2. Companion-way ..	75	67	65	
4 Feb. 44	0700	D2. Fully occupied, ports closed	92	88	85	Ordinary fan installed on 4.2.44
4 Feb. 44	0700	Outside shade temp. ..	86	80	76	No discomfort felt during the night 4/5.2.44
4 Feb. 44	2330	D2. Fully occupied, ports closed	88	82	77	
4 Feb. 44	2330	Outside shade temp. ..	85	78	72	
5 Feb. 44	0700	D2. Fully occupied, ports closed	85	80	79	Note drop on Wet Bulb since previous morning of 8° F.
SECTION 2. "C" DECK						
31 Jan. 44	2000	C Deck. (Outside) ..	82	73	64	
31 Jan. 44	2000	Corridor near hot wall outside cabin 436	85	74	58	Occupants complaining of excessive heat due to radiation from Engine Room Bulkhead
31 Jan. 44	2000	Cabin 436. FAN ON ..	85	75	62	
3 Feb. 44	2000	Cabin 442 (corridor outside) ..	88	80	69	Demonstrating uselessness of opening cabin door to relieve conditions inside cabin
3 Feb. 44	2000	Cabin 442 ..	82	76	75	Engine Room bulkhead cool at time
3 Feb. 44	2000	Cabin 408 ..	87	78	65	Cabin 408 near hot wall demonstrating rise in temp. due to radiation
3 Feb. 44	2000	Outside deck temp. ..	82	74	67	
4 Feb. 44	2200	Outside deck temp. ..	84	78	76	
4 Feb. 44	2200	Cabin 436 (3 occupants) ..	90	82	70	Demonstrating need of fresh air supply
4 Feb. 44	2200	Cabin 408 (4 occupants) ..	90	84	77	
4 Feb. 44	2200	Corridor outside cabin 408	89	81	70	Lights in corridor should be blacked out to facilitate opening of corridor roof ventilators. Note surface temp. of cool walls in corridor 90° F.
SECTION 3. "B" DECK						
4 Feb. 44	1115	Dormitory B8 (33 officers) ..	92	85	74	Observations as at time when defective spot was reported. No occupants, ports open
4 Feb. 44	1115	Outside shade temp. ..	86	80	76	Punkah louvre in operation, but very weak
4 Feb. 44	2200	Corridor wall ..	100	90	100	Surface temp. and RH. falling, but

4 Feb. 44	2200	Community B7	..	..	..	50	83	74	As above. In B8 punkah louvre system, air current poor
4 Feb. 44	2200	Dormitory B8	..	..	..	92	84	71	Punkah louvre system, air current good
4 Feb. 44	2200	Dormitory B10	..	..	..	87	81	77	
30 Jan. 44	1500	Deck temp. at inlet supplying dorm. B9 with air	..	..	..	74	64	56	
30 Jan. 44	1500	Air temp. as supplied in B9	..	..	..	81	67	45	Rise in temp. due to following causes: (i) heat from electric bulbs in cabin, (ii) radiation from hot water pipes running through dorm. to washplace near-by
30 Jan. 44	1500	B9 centre of rm.	..	..	..	82	69	42	
30 Jan. 44	2300	Outside deck temp.	..	..	..	73	67	71	
30 Jan. 44	2300	B9 cabin	..	..	..	83	73	60	
4 Feb. 44	2200	Deck temp.	..	..	..	84	78	76	
4 Feb. 44	2200	B9 fully occupied	..	..	..	87	81	77	Occupants said that air was much fresher, movement noticeably greater after coconut matting obstruction had been removed from trunking
29 Jan. 44	2330	B6 tp. deck (outside air)	..	..	..	70	65	75	
29 Jan. 44	2330	B6 fully occupied inside	..	..	..	82	72	60	Observations taken 10 feet from punkah louvre jets. One punkah louvre jet closed caused 25 per cent reduction in air velocity. Importance of non-obstruction of air flow demonstrated
31 Jan. 44	2315	Outside deck temp.	..	..	..	80	73	70	
31 Jan. 44	2315	Sep. ward accom. 8	..	..	..	80	74	74	
31 Jan. 44	1345	Deck temp.	..	..	..	78	69	62	
31 Jan. 44	1345	Room 4 centre	..	..	..	82	74	67	
31 Jan. 44	1345	Air entry through louvres	..	..	..	81	70	55	

SECTION 4.

SEPARATION WARD

Although W.B. readings vary only slightly the atmosphere in this ward was exceedingly stale as no fresh air vents are provided. It is most necessary that this ward of all places must be properly ventilated. The ordinary fan at present in use is quite inadequate

SECTION 5. CREW'S QUARTERS

Ports open, 13 occupants, walls warm owing to bakehouse

recently installed punkah louvre, allowed for the closure of ports during the blackout, and for conditions of maximum occupancy in tropical climates :

- i. The provision of a fresh air supply to the Separation Ward is essential and that, should a voyage in cold climates take place, heating would be necessary.
- ii. In dormitory " B " 9 occupied by 33 officers, hot water pipes just above the top tier of several 3 tier bunks* put an excessive load on the punkah louvre system and there were many complaints of discomfort.
- iii. In dormitory " B " 8 similar conditions to " B " 9 were found, considerable heat being liberated in the space by a hot floor, under which was situated a galley, and from the trunking of an extraction ventilation shaft which passes through the quarters, and which was found to be noticeably hot on some days.

In the corridor opposite these cabins, a large expanse of internal panelling had a temperature of 125° F., and in this connexion, attention is also drawn to data for cabins 436 starboard, and 408 port, two of a number of cabins in which observations were taken which show the increased temperature resulting from radiation by these hot walls. Appropriate lagging and air spaced panel insulation would eliminate this factor contributing to discomfort.

There is no provision for fresh air entry in any of the " C " Deck cabins occupied by troops in transit, and absence of fresh air supply naturally leads to rapid increase in humidity when ports are closed.

It was found that the ventilation in these cabins compared unfavourably with that of troop decks possessing the punkah louvre system.

In regard to air movement, it was found that stagnant air pockets collected in the centres of certain troop decks, viz. B6 and A5, and it is suggested that ordinary fans be installed at the foot of stairways leading to the upper deck to facilitate air movement in this direction, and, by so doing, increase the cooling power of the air as measured by the Kata thermometer.

Directional adjustment of individual louvres is necessary for the best general ventilation and it therefore suggested that some system of marking the louvres for this setting is used, for example, an arrow point on the louver and a black dot on the socket.

We regret that time does not allow us completely to assess the observations and data which we have collected, but the report as it stands comprises the main points. As the voyage was made from temperate to tropical zones, the last few days only were the most useful for testing the efficiency of ventilation with consequent reduction in time available for assessing the data.

February 6, 1944.

*It seems to be extraordinary that bunks should be located in close proximity to hot pipes, etc., in any ship destined for tropical voyages. Similar conditions recorded in this Journal were found in 1933 in H.M.T.D.— in which case several cabins had a top berth which became unusable after reaching the Red Sea, metal bars round and above the bunks were too hot to hold and air temperatures well over the 100° F. mark.—ED.

THE CONVALESCENT WING, ROYAL VICTORIA HOSPITAL, NETLEY

BY

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THE majority of medical officers will probably admit that they have only a hazy idea of what a Convalescent Wing or Depot is, or of what goes on there. The following notes on the 500 bedded Convalescent Wing at Netley will therefore, it is hoped, be of general interest.

OBJECT AND METHOD

The word "Convalescent" tends to conjure up visions of deck chairs, tea on the lawn, and occasional strolls on sunny afternoons, and for that reason is misleading. A title such as "Physical Rehabilitation Centre," although cumbersome, would more accurately describe its functions and object.

Briefly the aim of the Convalescent Wing is to render sick and disabled men fit for full duty in their units in the minimum time. Experience and observation of results have evolved the methods now in use to achieve this aim. These methods are nevertheless constantly under review, and alterations are made whenever they are considered likely to effect an improvement.

One of the main principles is the avoidance as far as possible of the hospital atmosphere, every man being made to feel that he is no longer an invalid, but has taken a big step towards taking his place in his unit again. The men are called trainees, not patients or even convalescents, and wear their ordinary uniform instead of hospital blues. They are on full rates of pay, and are allowed out after duty hours until 10 p.m. Most of them are also given week-end leave passes, provided they are fit to travel. They are not on hospital diet, but receive the ordinary diet with a special supplement amounting to about 400 calories.

Another important point is that on discharge from the Convalescent Wing a man must be fit for full duty in accordance with PULHEEMS classification. Those who have done R.M.O. duties will agree that the man returned to his unit, after illness or operation in hospital, as "Attend B" or "Attend C" for a number of weeks is usually little more than a nuisance to the medical officer and to the unit as a whole. The need for this awkward phase can and should be avoided by sending such cases to the Convalescent Wing or Depot instead of direct to their units. They will then be discharged fit for full duty, and, what is more important, will be much less liable to subsequent breakdown.

TRAINING PROGRAMMES

The basis of the whole system is a series of programmes of graduated activity, the majority of trainees spending a week in each of four grades

before returning to their units. The week's programme for Grade 4, at the lower end of the scale, contains such items as five periods of "Corrective" exercises, mostly of the breathing, abdominal, and postural type, six periods of minor games, six short road walks, and three periods of P.T. of a modified nature. The Grade 1 programme, in contrast, contains six periods of much more active P.T., two route marches, a cross country run, and an afternoon of organized games. Grades 3 and 2, of course, constitute a gradual progression from 4 to 1. It might be mentioned here, for the information of officers who remember the wartime Convalescent Depot, that Grade 1 now is far from being the gruelling test that it was then, with its full scale assault courses and exacting tests of fitness. There is a very miniature assault course here, but it is used only as a change from games and exercises, and not as a test. Tests of fitness have been dropped, and the question of whether a man is fit to return to his unit is entirely a matter for the medical officer to decide, taking into consideration the type of duty each man will be going back to. As for the route marches, the longest is 5 miles, while the cross country run is usually about 2. no time limits being set for either.

Although the average case on admission is placed in Grade 4, there are many exceptions. Some are fit enough to go straight into a higher grade, and their stay here is correspondingly shortened. Others may start in Grade 4, but make such good progress that they can quite safely miss out a grade on the way up. There are, too, frequent instances where a man is so obviously fit after a week or two that he is returned to his unit without being passed through the top grades. Discharge from a lower grade is also used where a man, although not yet fit enough to tackle the higher grades, will be returning to sedentary duties in his unit, or where it is obvious that he will never be fit for a higher grade. In the latter case his PULHEEMS is lowered before discharge.

So much for the short cuts to discharge. There is another large group, however, who on admission are not fit to be placed even as low as Grade 4. For them a special grade, known as "0" has been introduced, in which the amount of exercise is similar to that expected in the "Deckchair and occasional stroll" type of convalescence. Into Grade 0 go such cases as post-meniscectomies and leg fractures, especially those still in plaster, and medical cases with severe debility or anæmia. Their programme consists only of diversional therapy and restricted remedial exercises, with a large proportion of leisure time. No men in this grade, or for that matter in Grade 4, are allowed to be given any fatigues, although even in the other grades the time spent on fatigues is normally limited to four hours in the week, careful watch being also maintained to ensure that no work is given which might be in any way harmful or likely to delay recovery.

There are no limits fixed as to the length of time a man may stay in any one grade or in the Convalescent Wing, other than those imposed by the Long Term Treatment Scheme. Although the average stay over a year's admissions worked out at five weeks, there are, of course, very wide variations. Some

may be discharged in a fortnight or less, while others may remain for three months, six months, or even longer.

REMEDIAL CLINICS

In addition to being placed in the appropriate grade, a large proportion of men are put in three remedial groups, of which one is for postural defects, another for upper limb disabilities, and the third for lower limb disabilities. Two clinic periods of one hour each are held daily for each of these groups, and trainees in them are instructed that their remedial clinics take precedence over any other period of their grade programme. They are held in the specially equipped remedial room under the supervision of an experienced instructor who ensures that exercises are given to suit individual disabilities.

The more specialized forms of physiotherapy also play a very important part in the treatment of many cases, and attendance for such treatment is so arranged that it does not clash with the remedial clinics. The maximum concentration of treatment is thus focused on the affected part.

SPECIAL CASES

In addition to cases admitted from hospitals a number of men are sent in direct from their units, generally on the advice of the Command Specialist in Physical Medicine, to whom they have been referred on failing their P.T. tests in A.B.T.U.s. The majority of these are substandard recruits suffering from physical underdevelopment, in a large proportion of whom there can be found varying degrees of spinal deformity or other postural defects.

Up to the end of June 1950 these had been treated along with other trainees by placing them in as high a grade as was compatible with their general condition and by arranging their attendance at postural clinics. By that time, however, their numbers had risen to over 50, and it was considered desirable to form them into a separate group with its own training programme, in the same way as is done at 114 Convalescent Depot in Western Command. In their programme emphasis is laid on open-air work, endurance training, and postural exercises. They are given an extra pint of milk a day, and cod-liver oil and malt if markedly underweight, and are encouraged to ask at mealtimes for second helpings, which can often be provided. The planned exercise, fresh air, and increased diet generally succeed, often to a remarkable extent, in increasing their weight, improving their general physique, and in preventing early spinal curvatures from progressing, and becoming fixed. Their average stay is six to eight weeks, after which time the great majority can perform their A.B.T.U.s tests satisfactorily.

The practice of sending such recruits to convalescent depots is open to criticism, but with the loss of physical development centres and with conditioning courses in commands demanding transfers with potential improvement to PES FE, this method of disposal saves many recruits from rejection on medical grounds.

The foot deformities are another class often admitted direct from their units, but are much more of a problem than the underweights. In some cases

physiotherapy and remedial exercises, including correction of bad postural or locomotory habits, effect a considerable improvement, but the majority require special shoes, wedged heels, metatarsals bars, etc., and often a further course of instruction in correct walking after these have been fitted.

STAFF

The success of the Convalescent Wing depends to a large extent on close co-operation between all sections of the staff : medical officers, physiotherapists, P.T. instructors, and administrative staff.

There are two medical officers on the establishment, one the officer in charge, the other a specialist or trainee specialist in physical medicine. In addition the Southern Command Specialist in Physical Medicine is based on the Convalescent Wing. He advises on treatment in general, and deals personally with most of the orthopædic cases.

Every trainee is seen on admission by one or other of these officers, and is of course seen by them from time to time while at work in the gymnasium, remedial room, or on the sports field. They are all reviewed each Friday, when their progress is assessed with a view to up-grading or discharge if fit enough. They have the added advantage here that they can be seen at any time by the medical or surgical specialist of the hospital, although, if specially requested, cases can be returned for follow-up examination by the medical officer sending them in. Visits by medical officers to see how their cases are progressing, or simply to see for themselves how the system works, are of course welcome at any time.

The physiotherapists work in accordance with the medical officers' instructions in two very well-equipped departments, *one of which is also used as the training school for army physiotherapists*. Many forms of treatment are given, such as appropriate active exercises, radiant heat, infra-red, ultra-violet and short-wave diathermy. During May 1950 a total of over 1,000 treatments were given.

The P.T. instructors are all members of the Army Physical Training Corps who have passed a special course in remedial work. They all take a very keen interest in their work, which of course is the mainspring of the whole system, and are a great help to medical officers in assessing the trainees' progress. The most experienced instructor is normally in charge of the special remedial clinics.

The general administrative work, including pay, discipline, welfare, and accommodation, is in the hands of a staff which is still composed of extra regimentally employed personnel, although the latest establishment allows for an almost entirely R.A.M.C. staff. The fact that they are not R.A.M.C. does not, however, create any difficulty, and they are always in close touch with the medical and P.T. staff to ensure that programmes are adhered to and that men do not miss essential parts of their treatment.

ACCOMMODATION

All trainees are accommodated in the main block of the Royal Victoria Hospital, overlooking Southampton Water. This is the original building, which

is now nearing its centenary, and which with its numerous rooms and lengthy corridors is not suitable by modern standards for hospital patients, who are now housed in a separate building, erected during the war. It is nevertheless almost ideal for the Convalescent Wing, containing as it does, in addition to the men's rooms, the physiotherapy department, M.I. room, plaster room, educational department, and all the necessary adjuncts to fill in leisure hours, such as quiet room, billiards room, table tennis room, dance hall, cinema, and theatre.

The hospital grounds include a very large playing field with pitches for hockey, Rugby and association football, and many acres of woods and tree-studded lawns, with, in addition, the hospital's private beach and pier. Situated behind the main block are the new gymnasium, with its outdoor basket ball, and volley ball pitches, and the remedial gymnasium, which contains special equipment such as fixed bicycles, rowing machines, and numerous arrangements of ropes and pulleys for exercising particular joints or muscle groups.

Also standing in the grounds are a large N.A.A.F.I., an exceptionally large and well-appointed Y.M.C.A. building, and an excellent diversional therapy department, where men can do anything from needlework to woodwork under the expert guidance of the B.R.C.S. staff.

CONCLUSION

There are no hard and fast rules laid down as to how a Convalescent Depot or Wing should be organized and administered, and as already mentioned changes are often made. Consequently it will be found that training programmes and methods vary to a considerable extent in other similar establishments. Needless to say, the amenities, sports facilities, etc., will also vary according to the locality and accommodation available. Nevertheless, the object is the same in all, namely to return men to their units as fit as possible and as soon as possible.

ACKNOWLEDGMENT

My thanks are due to Colonel J. W. Hyatt, Officer Commanding, Royal Victoria Hospital, Netley, for permission to publish these notes.



At Random

CANCER AND CIGARETTES

CANCER would not appear, on first thoughts, to be very much a concern of medical officers in the Services in which the bulk of the population is in the prime of life, is composed of strictly selected individuals and leaves the Service before manifestations of the condition are probable.

In some of the more recent reports Cancer is, however, definitely shown amongst the causes of discharge. In a *Report on the Health of the Army*¹ discharges for malignant neoplastic conditions in 1943-45 averaged approximately 0.6 per cent only of the total discharges for Other Ranks (males) and only 0.4 per cent of those for A.T.S. (women), but 1.8 per cent of the discharges from the Q.A.I.M.N.S. and V.A.D.s (women). These figures refer, of course, to all types of malignant neoplasm whereas the reference under the title *Cancer and Cigarettes* is to neoplasm of the lungs.

But even of this condition there is undoubtedly in the Services a small number of cases which persistently appear amongst the more senior members of the Services, particularly very senior Officers and Warrant Officers with long service.

In these cases diagnosis is often extremely difficult and sometimes definitely too late because of the lack of local facilities, because of the unwillingness of such Seniors to report sick and to risk loss of an important post or high responsibility and because an accommodation diagnosis of *a little bronchitis* or of *a touch of asthma* has already been made elsewhere by some casual medical man or some diffident junior officer. We can recall some eight to ten such cases amongst military and other Service Seniors.

Cigarettes, on the other hand, appear to be very much the concern not only of medical officers in the Services but of many other officers in charge of supply, transport and welfare.

It is astonishing to think of the rapid growth of smoking and to realize how much the cigarette habit has increased in the past twenty-five years. The volume of tobacco consumption in recent times can be assessed by the facts that in one family of manufacturers there were five millionaires, that those concerned with the trade can advertise so lavishly and expensively and that no inconsiderable part of the revenue of the country and indeed of other nations is derived from the heavy taxation thereon.

So much so has this habit increased in the Services that on field service during the last war the importance of the cigarette ration appeared at times to pre-

¹The Statistical Report on the Health of the Army, 1943-45. His Majesty's Stationery Office, London, 1948, pp. 294. Price £1.

dominate over that of food. When about half the forces on the eastern (Burma) front were on half rations (food) for many weeks owing to the difficulties of supply, it was somewhat disconcerting and distressing to hear that a supply ship had actually reached Calcutta safely of which almost the entire cargo was a consignment of cigarettes. It may be added in parenthesis that the Pipe Smoker often had considerable difficulty in securing a pipe-tobacco-ration.

But this note is not intended to be a disquisition on the merits and demerits of cigarette smoking and its effects on efficiency, sociability or nerves. There are smokers and non-smokers in plenty who will only too willingly enter into heated argument on this vexed subject. It is pertinent to the subject, however, to recall one or two points before leaving this aspect. It is interesting to look around and see the number of senior men and women who used to be cigarette smokers and have now given it up; this may, of course, be a result of the present fantastic financial aspects of the luxury, and on the other hand to note that many an ardent junior smoker is spending at least £100 a year on his/her fancy. It is interesting to note that in a series of trials in the Aldershot Command some years ago it was found that in short distance races smokers and non-smokers were equally represented in the first ten and the last ten, but in long distance races all the first ten were non-smokers and all the last ten were heavy cigarette smokers.¹

But it is to the subject of Cancer and Cigarettes to which this note is intended to draw attention. The subject has recently² been much to the fore in current medical journals and has received further publicity from certain articles in the lay press and certain claims in respect of a cure for cancer which is now to have an official examination by a select committee under the orders of the Minister of Health.

Investigation into the subject of Cigarettes and Cancer has been most ably carried out with very considerable labour and care by a team from the Medical Research Council and embodied in their report³ and published in the *British Medical Journal* in September 1950.

The conclusions of this Report and the most startling figures obtainable therefrom have been emphasized in the leading Article of the same number of that Journal. It is indeed startling to realize that the deaths from cancer of the lung, which can be attributed in considerable part to the increase in cigarette smoking, have increased more than *fifteenfold in the past twenty-five years*, the deaths being 612 in 1922 and 9,287 in 1947 for England and Wales.

With this heavy increase in the incidence and deaths from cancer of the

¹Would some ardent hygienist or smoker care to check these figures, to refute or confirm them and finally to let the Journal have an interesting or even a provocative article on the subject.

²This note was written in early October for our November make-up, but, as all readers will now have realized, publication has been much delayed by the trade dispute.

³Smoking and Carcinoma of the Lung, Preliminary Report. By Richard Doll, M.D., M.R.C.P., and A. Bradford Hill, Ph.D., D.Sc. *B.M.J.*, September 30, 1950, pp. 739-748.

lungs in the general population there must presumably be a concurrent increase in the Services and Service medical officers must perforce bear in mind the possibility of this diagnosis in obscure cases of "*Chest trouble.*" Furthermore, surely *the limitation of cigarette smoking* should be a duty or at least a desirable part of the work of medical and welfare officers and of true hygienists with a view to the prevention of cigarette induced cancer.

Matters of Interest

I

THE Director-General, Army Medical Services on the invitation of Major-General Guy B. Denit, Medical Corps, U.S. Army, Chief Surgeon, European Command visited the U.S. zone of Germany from September 15 to 20, 1950.

He visited many field medical units of the Medical Corps, including an evacuation hospital, a field hospital and a clearing company. During the manœuvres the chain of evacuation from the front line to the Evacuation Hospital, which corresponds to our Casualty Clearing Station, was followed. The medical equipment was a point of interest and amongst items seen were new types of immersion water heaters for use in the field and cooking apparatus. The Director-General also visited one of the static general hospitals of the U.S. Medical Corps at Frankfurt.

II

THE Director-General of the Canadian Army Medical Services, Brigadier W. L. Coke, came on a visit to this country and also attended the British manœuvres in Germany. Brigadier Coke's programme included the R.A.M.C. Depot, the R.A.D.C. Depot, the Q.A.R.A.N.C. Depot, the Army School of Health, the R.A.M.C. College and the Q.A. Military Hospital, Millbank. A Cocktail Party in his honour was given in the Headquarters Mess on October 9.

III

THE D.G.A.M.S. inspected 26 Field Ambulance at the Army School of Health, Mytchett on September 25, 1950.

The Field Ambulance was drawn up on parade under the command of Lieut-Colonel A. MacLennan, *O.B.E.*, R.A.M.C.

After the inspection the Field Ambulance marched passed and the D.G. gave a short address stressing the importance of health discipline and wishing them good luck and a safe return.

The other regular officers who are accompanying the unit are Major E. Gareh of the Field Surgical Team, Major W. B. Hubbard and Major W. S. Y. Mackay, Dental Officers of the Mobile Dental Team, and two non-medical officers, Captain (QM) L. H. Osborne and Captain W. J. James. The remainder of the officers are Short Service Reservists who have been called up for service. Many of the men on parade were Reservists with a considerable amount of war service.

Reviews

THE SCOURGE OF RHEUMATISM. Current Medical and Social Views presented by the British Rheumatic Association. With an introduction by the Rt. Hon. The Lord Horder, *G.C.V.O.*, M.D. 1950. London. William Heinemann, Medical Books, Ltd. Pp. 85. Price 5s.

This publication is a report of a conference held by the British Rheumatic Association in September 1949. It will broaden the views of those whose knowledge of the rheumatic diseases is based on textbook information and hospital practice. In the discussions reported the problems of the rheumatic patient are carried from acute illness through reablement to resettlement in industry. The problems of treatment and reablement are discussed in one of their most difficult fields, that of rural patients with no ready access to treatment centres. Dr. W. S. Tegner contributes to this section much valuable information on practical measures to meet the requirements of physiotherapy under circumstances in which the services of a trained physiotherapist are not available. He points out that many old-time domestic methods are useful and may be successful, clears up any mystery regarding electrical treatment, and affirms that voluntary contraction of a muscle without moving the limb is preferable to faradism for strengthening weak muscles. The administrative problem as it affects Regional Hospital Boards is clearly presented by Dr. A. B. Williamson. The principles underlying the application of the Disabled Persons Employment Act are ably presented by Miss Norah Hill, and from this the reader passes on to an account of Remploy Ltd., the function of which is the employment of the disabled, and to a discussion on the problems and employment of the household rheumatic sufferer. Information on the work of voluntary organizations completes the volume. Throughout the contributions personality and psychological factors as they affect the issue receive careful consideration. The book gives a comprehensive view of the necessary integration of widely different services to meet the problems presented by the rheumatic patient.

J. B.

A MEDICAL HANDBOOK FOR ATHLETIC AND FOOTBALL CLUB TRAINERS. By W. D. Jarvis. London. Faber and Faber Ltd. 1950. Pp. 143. Price 10s. 6d.

To attain the standard of efficiency for the ideal trainer envisaged in Mr. Jarvis's introduction would require four to five years' full-time study. This book is written for those who can never receive such training and any suggestion that they might ever undertake manipulative or electrotherapeutic techniques is contra-indicated.

The physiology of posture, conditioned reflexes, muscle development and fatigue are of vital importance to the trainer but they have been omitted or dealt with too sketchily. The details of skull bones and muscle insertions are

of little value and might well have been replaced by the functions of the main muscle groups only. Errors in the action of the sterno mastoid and the insertion of the quadriceps require correction.

The sections on major injuries are adequate and of undoubted interest to the layman but to the athlete the trivial injury prior to some event is of more importance. The trainer's work in preventing co-ordinate action and maintaining performance in these cases has been overlooked.

Attempting to cover such a vast field this book lays itself open to criticism but it is a worth-while attempt to introduce the part-time trainer to his subject and stimulate him to further reading.

J. M. M.

Obituary

Major WILLIAM SYLVESTER CROSTHWAIT

In Brighton on September 11, 1950, Major William Sylvester Crosthwait, Royal Army Medical Corps, Retired. Born March 24, 1873, he took the L.R.C.P. and S.I. in 1893 and having served as a Civil Surgeon from November 21, 1899, till April 12, 1900, he was commissioned Lieutenant R.A.M.C. June 21, 1900. Promoted Captain June 21, 1903, and Major June 21, 1912, he retired February 2, 1922. He held the R.P. appointment at Ipswich from February 4, 1922, till transferred to Brighton, January 13, 1923. He ceased to be employed November 30, 1928.

He took part in the operations in Cape Colony in 1902, being awarded the Queen's Medal with two Clasps.

He served in Egypt in June and July 1915, in Gallipoli from July 1915 until January 1916, in the Persian Gulf in 1916, and then in Salonika until 1917, and in France and Belgium from February 12, 1917, till January 1, 1920. Mentioned in despatches (*L.G.* September 6, 1918) for valuable services on the occasion of the sinking by the enemy of Hospital Ships, he received the 1914-15 Star, British War and Victory Medals.

Colonel JAMES EDWARD SWYER

In London on September 21, 1950, Colonel James Edward Swyer, late Royal Army Medical Corps, Officer in Charge of the Army School of X-rays and Adviser in Radiology to the Army. Born June 14, 1901, he took the M.R.C.S. England and the L.R.C.P. London in 1925, and the D.M.R. England in 1937.

Appointed Lieutenant March 14, 1928, he was promoted Captain September

14, 1930, Major March 14, 1937, Lieut.-Colonel March 1, 1947 and Colonel March 28, 1950.

He became a Prisoner of War on the fall of Hong Kong and returned to England October 31, 1945. He was in possession of the 1939-45 and Pacific Stars and the Defence and War Medals.

Colonel Swyer is survived by his wife and two children to whom our heartfelt sympathy and sorrow are extended.

Colonel W. A. D. Drummond, late R.A.M.C., Commandant, Q.A. Military Hospital, Millbank, writes:

With his death the Corps has lost a kindly and tolerant officer whose main concern was for his patients, students and staff. Although reticent by nature, he had a strong sense of humour, which with his frank manner gained for him the confidence and loyalty of all around.

Swyer was a generous host, and on entering his house one was immediately aware of a friendly and considerate atmosphere. It was very evident that his family and home meant a great deal to him.

His creative instincts found expression in the planning of his garden in which he would work untiringly with the skill of an accomplished artist to mould the lawns and flower beds into a natural landscape.

To be associated with Colonel Swyer was a privilege and those of us who enjoyed it feel the loss of a friend and comrade.

Colonel BERTRAM CECIL OWEN SHERIDAN, M.C., M.B.

In Fleet on October 22, 1950, Colonel Bertram Cecil Owen Sheridan, *M.C.*, *M.B.*, late R.A.M.C., Retired. Born December 24, 1889, he took the *M.A.*, *M.B.* Dublin in 1914 and was commissioned Lieutenant Royal Army Medical Corps, SR. August 6, 1914, being mobilized November 11, the same year. Promoted Captain May 11, 1915, he was appointed to a regular commission May 1, 1919.

He was Adjutant in 42 (East Lancashire) Division T.A. from April 29, 1926, till March 3, 1929. Promoted Major November 11, 1926, and Lieutenant-Colonel, July 15, 1939, he retired with hon. rank of Colonel, August 30, 1947.

He served in France from December 15, 1914, till the end of the war, being awarded the *M.C.* (*L.G.*, May 26, 1917) for conspicuous gallantry and devotion to duty. He tended the wounded continuously for twelve hours under very heavy fire, setting a splendid example of courage and devotion. Mentioned in despatches (*L.G.*, January 4, 1917), he was also awarded the 1914-15 Star, British War and Victory Medals.

He again saw service on the North-West Frontier in the campaigns in Waziristan and in the Mahsud country. between 1919 and 1924, receiving the Medal with three clasps and a mention in despatches (*L.G.*, May 30, 1924).

He received a further Clasp for the campaign in Burma 1930-32.

On the outbreak of war in 1939 he was stationed in Mauritius, where he remained till June, 1940. He took part in the operations in Madagascar, May to December, 1942, served in Egypt, Palestine and Lebanon in 1942 and 1943, and in Iraq in 1943 to 1945.

Extracts from the "London Gazette"

HONOURS AND AWARDS

London Gazette 22.9.50

Awarded The Territorial Efficiency Decoration with 1st Clasp :
Major R. K. Reeves.

Awarded The Territorial Efficiency Decoration :
Lt.-Col. G. M. Komrower.
Capt. (Hon. Major) J. Kerr.
Capt. (Q.M.) G. W. Dix.

PROMOTIONS

(1) *R.A.M.C.*

(a) To be Major :

Capt. J. H. Bennett, M.B.	15.8.50
Capt. J. P. Scrivener, <i>M.B.E.</i>	12.9.50
Capt. H. D. G. Hetherington, M.B.	12.9.50

(b) To be Major (Q.M.) :

Capt. (Q.M.) V. H. Muir	28.9.50
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(c) To be Capt. (S.S.C.) :

Lt. B. Karat	11.9.50
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(d) To be Capt. (Q.M.) (S.S.C.) :

Lt. (Q.M.) J. E. Jones	11.9.50
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(2) *R.A.D.C.*

To be Capt.

Lt. R. Baines	28.9.50
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APPOINTMENTS TO REGULAR ARMY SHORT SERVICE COMMISSIONS

(1) *R.A.M.C.*

(a) Lt. Basil Karat from National Service List to be Lt., 18.9.50, retaining present seniority.

(b) Richard Kelly-Wisheham, B.M., to be Lt., 20.8.50.

RETIREMENTS

(1) *R.A.M.C.*

Lt.-Col. J. E. Rea., M.B.	28.8.50 (Hon. Col.)
Capt. J. A. W. Brown (S.S.C. Type " B ")	29.8.50

HONOURS AND AWARDS

London Gazette 4.7.50

Award of " 3 clasps " to the Efficiency Decoration (Territorial).
Colonel J. L. Hamilton, *M.C.*, *T.D.*, *M.D.*, *D.L.*

Award of " 1st Clasp " to the Efficiency Decoration (Territorial).
Major J. Cohen, *T.D.*
Major J. B. Mackay, *T.D.*

Award of " Efficiency Decoration (Territorial) and the 1st Clasp."
Major (T/Lt.-Col.) E. A. Cormack.
Major R. A. P. Gray.
Major C. H. Imrie, M.B.

Award of "Efficiency Decoration (Territorial)."

Royal Army Medical Corps.

Major (Hon. Lt.-Col.) R. E. Norrish.

Major J. B. Schofield.

Royal Army Dental Corps.

Major F. E. Street, M.C.

London Gazette 7.7.30.

Awarded the 4th Clasp to the Efficiency Medal (Territorial).

Capt. (Q.M.) W. Crosby, R.A.M.C.

Awarded the 3rd Clasp to the Efficiency Medal (Territorial).

Capt. (Q.M.) W. Crosby, R.A.M.C.

Awarded the 1st Clasp to the Efficiency Medal (Territorial).

Lt. P. G. Pratt, R.A.M.C.

Awarded the Efficiency Medal (Territorial).

Lt. (now Capt.) R. H. Thorne (now R.A.).

PROMOTIONS

(1) *R.A.M.C.*

(a) To be Majors :

Capt. H. A. Kreiser, M.B. 28.3.50

Capt. I. E. Harries (S.S.(Spec.)) 7.2.50

(b) To be Capt. :

Lt. D. G. B. Riddick 29.5.50

Substituted for notifi. in *L.G.* (Supp.) dated 2.6.50)

(c) To be Capt. (Dir. of Music) :

Lt. (Dir. of Music) L. D. Brown, L.R.A.M., A.R.C.M. 30.7.50

(2) *R.A.D.C.*

To be Lt.-Colonel :

Major W. F. Finlayson 4.4.50

APPOINTMENTS TO REGULAR ARMY AND SHORT SERVICE COMMISSIONS

(1) *R.A.M.C.*

(a) Capt. (War Subs. Maj.) John Joseph Voller, from Short Serv. (Spec.) Commn., to be Capt., 25.6.50, retaining present seniority.

(b) Captain John Roger Hawkings, M.B., from Emerg. Commn. to be Capt., 11.4.50, with seniority 22.8.49.

(c) Michael Herman Fruithof, M.B., is appointed to a Short Serv. Commn., 25.6.50, in the rank of Lieut.

(d) James Benedict McCaffrey to be Lt. (Short Serv. Commn.) 30.7.50.

RETIREMENTS

(1) *R.A.M.C.* (*Short Service Commissions*)

Capt. P. M. Bretland, M.B. 30.6.50 (Hon. Major)

Capt. J. P. Stuart, M.B. 30.6.50

Capt. P. M. F. McGarry, M.B. 30.6.50

Capt. D. P. North, M.B. 30.6.50

Capt. P. A. Hood, M.B. 30.6.50

Capt. G. A. K. Missen, B.M. 30.6.50

Capt. P. R. Needham 30.6.50

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Notices

I

APPOINTMENT AS SHIP'S SURGEON

LIEUT.-COLONEL J. R. Hayman, R.A.M.C., Retired, at present Surgeon *en voyage* the Admiralty Tanker "Olna," writes :

The "Olna" is expected home about the end of December or beginning of January, when probably she will require a Surgeon, as Colonel Hayman, who has been sailing with her for two years, may be taking leave.

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Further particulars may be obtained from Lieut.-Colonel J. R. Hayman, 44 Marchfield Road, Alcombe, Minehead, Somerset, on his arrival home in December or January or from the R.F.A. Branch of the Admiralty.

II

WAR OFFICE PRIZE ESSAYS

BERTRAND STEWART PRIZE ESSAY COMPETITION, 1951

The subject for next year's competition is as follows :

"The increased complexity of design of modern equipment creates a demand for more skilled personnel to maintain it. It has been suggested that, as a result

of this, the Army is becoming top heavy in second and third line maintenance units and that the fighting unit is being shorn of its ability to fight and maintain its own equipment. Discuss this and give your views as to the most suitable division of responsibility for maintenance in war between combatant units and the maintenance service."

The conditions are the same as for this year and were given in our letter ref. : 114/Gen/8176 (MT 16) of August 9, 1948.

Any queries should be addressed to the War Office (MT2).

III

ROYAL ARMY MEDICAL CORPS WEEK—PROGRAMME OF EVENTS

<i>Date</i>	<i>Event</i>
June 3	Church Parade Coys. at Home to Parents and friends
June 4	Heats Swimming Gala—Aldershot Military Swimming Baths
June 5	Swimming Gala—Aldershot Military Swimming Baths—1900 to 2100 hrs. McGrigor Mess Supper Party No. 1. Coy. All Ranks Dance
June 6	Cricket Match Officers R.A.M.C. v. R.A.O.C. at Officers' Club Ground—all day R.A.M.C. Ball at Officers' Club Heats of Corps Sports
June 7	King's Birthday Parade—a.m. Corps Sports—1400 hrs. O.R.s Dance —R.A.M.C. Depot
June 8	" At Home " " Dinner "

JOURNALS RECEIVED

THE following Journals have been received and are available in the Library of the R.A.M. College.

Practitioner, Military Surgeon, Medical Press, Bull. of Hygiene, Medical Journal of Australia, Lancet, Brit. Med. Journal, South African Medical Journal, Indian Jour. of Medical Research, Journal of the R.S.I., Glasgow Medical Journal, Bull. of the Johns Hopkins Hospital, Indian Journal of Malariology, Post Grad. Medical Journal, Journal of the Royal Institute of Public Health & Hygiene, St. Barts Hospital Journal, British Med. Bulletin, Chronicle of World Health Organization, Revista de Medicina Militar, Proc. of the Royal Soc. of Medicine, Journal of the R.A.S.C., Bull. International des Services de Santa, Tropical Diseases Bulletin, Edinburgh Medical Journal, Journal of R.A.V.C., Clinical Proceedings, Indian Medical Gazette, Journal of the Royal Egyptian Medical Assn., Revue du Corps de Sante Militaire, Archives del Hospital Universities, Quarterly Journal of Medicine, Military Review, Journal of Biology and Medicine, East African Med. Journal, Clinical Journal, U.S.A. Forces Medical Journal, British Journal of Dermatology and Syphilis, Canadian Journal of Public Health, Journal Royal Naval Medical Services, London Hospital Gazette.

EDITORIAL NOTICES

The Editor will be glad to receive original communications upon professional subjects, travel, personal experiences, etc.

Correspondence on matters of interest to the Corps, and articles of a non-scientific character, may be accepted for publication under a *nom de plume*.

All Communications or Articles accepted and published in the "Journal of the Royal Army Medical Corps" will (unless the author notifies at the time of submission that he reserves the copyright of the article to himself) become the property of the Library and Journal Committee who will exercise full copyright powers concerning such Articles.

A free issue of twelve reprints will be made to contributors of Original Communications, and of twelve excerpts in the case of Lectures, Travels, Clinical and Other Notes. Such free reprints or excerpts will, however, owing to the shortage of paper, only be sent to those specifying their wish to have them, and a request for them should accompany the article when submitted for publication, the request being made in the form of a note at the foot of the manuscript.

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Communications in regard to editorial business should be addressed—"The Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, A.M.D.2, War Office, London, S.W.1."

MANAGER'S NOTICES

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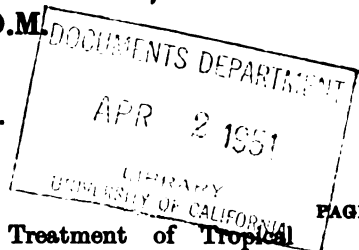
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Journal of the Royal Army Medical Corps

Original Communications

PERSPECTIVES IN THE CONTROL OF EPIDEMIC INFLUENZA

BY

C. H. STUART-HARRIS, M.D., F.R.C.P.

Professor of Medicine, University of Sheffield

PART II

II. IMMUNIZATION

THE approach to the problem of the control of influenza has throughout been pursued along two parallel lines. The first of these as detailed in Part I of this series has been the pursuit of methods of control of airborne infection, and represents an ideal approach to the prevention of spread not only of influenza but of many other diseases of the respiratory tract. The second, namely the development by artificial immunization of an enhanced resistance to infection on the part of the individual, suffers from at least one major disadvantage. The limitation of all methods of immunization which depend upon the stimulation of the antibody defence mechanism of the host is that they are therefore highly specific. This is the rock upon which immunization against influenza has already well-nigh foundered, but the relative weakness of all other available methods of prophylaxis is such that even the drawback of specificity does not rule out immunization as a possible measure.

THE BASIS OF IMMUNIZATION AGAINST INFLUENZA

Virus vaccines were sought for at a very early stage of the experimental work on influenza virus, and yet critical observers might even then have pointed out certain fundamental difficulties. For up to date, immunization has achieved its greatest success in infections which lead to a permanent immunity and influenza is a classical example of a disease in which recovery from natural infection produces only temporary respite. The evidence now in existence (Pickles *et al.*, 1947; Sigel *et al.*, 1950) suggests, however, that

natural infection by influenza of a human herd is resisted for from two to four years after an outbreak so that there is at any rate a phenomenon of temporary resistance. The second objection, bound up perhaps with this temporary immunity, is our inability to define the basis of natural immunity or susceptibility to influenza. Antibodies, whose measurement affords a relative indication of the humoral changes which accompany infection, were at first regarded as the sole basis of immunity. It is still true that antibodies either in the individual, or in the population as a whole, undergo repeated cyclical changes in titre and are present in greatest amount during convalescence from infection. It is true also that the majority of those individuals who fall ill during an outbreak of influenza is drawn from the ranks of those possessed of the lowest levels of antibodies prior to infection. But, it is also true that instances are known where infection has occurred in spite of the existence of an antibody level seemingly of the same order as that encountered in convalescence. As a converse also, individuals with low antibody levels may pass through an outbreak of influenza without falling victim to the disease. Although therefore the general parallelism of antibody content and resistance to infection cannot be doubted, there is no simple equation between the two. For this reason, the existence of other barriers to infection, such as the nasal and often respiratory tract defence mechanisms, has been regarded as more than probable. The recent work upon the mucoids of the respiratory tract by Burnet and co-workers (Burnet, 1948) has indeed afforded a possible mechanism whereby the respiratory tract may inactivate particles of virus which gain access to it and thereby stifle infection. As yet, however, such defences remain untested and are not susceptible to measurement, unlike the titre of antibodies in the serum itself. The third objection to immunization as a method of control of influenza is bound up with practical application in the field and can best be considered later.

EXPERIMENTAL IMMUNIZATION OF ANIMALS

Ferrets and mice have been chiefly used in the study of immunization in animals. Mice, in which the influenza viruses induce pneumonia, are relatively easy to protect by inoculation either with living or inactivated virus by routes other than the intranasal one. Ferrets, on the other hand, in which the infection by human strains of virus is a nasal one, are relatively difficult to protect. Indeed, ferrets which have never been infected at all cannot be protected from nasal lesions by inoculation parenterally either by inactivated or living virus. Ferrets which have had one attack of influenza, but which have, through passage of time, suffered a waning of immunity can be restored to a level of solid immunity by parenteral inoculation with virus vaccines. In view of the universal exposure to infection by virus, at any rate in the case of adults, the human problem may be analogous to that of the ferret with waned immunity.

Although experiments on man have continued the study of the fundamental basis of immunization begun in animals, the latter still afford an essential tool in the hands of those engaged in testing vaccines. This is because mice can

be used as a test-group in which the potency of a vaccine can be measured by subsequent challenge of immunity by trial inoculation with living virus. Similarly, the development of antibodies in the sera from a group of vaccinated animals affords a further basis for measurement of the antigenicity of the vaccine. Ferrets, mice or rabbits can be utilized in such experiments and the antibody content of the sera can be accurately titrated either by further animal inoculation with serum-virus mixtures (neutralization test) or by *in vitro* methods such as the agglutination-inhibition test of Hirst (Hirst, 1942).

Moreover, work on animals long ago stressed the quantitative relationship between the amount of antigen incorporated in the vaccine and the degree of the resultant immunity (Francis, 1939). The significance of antigenic differences between the various strains of the influenza viruses also became apparent from work on animals and the existence of several serological races of the influenza viruses (Magill and Francis, 1938; Smith and Andrewes, 1938) is of major importance. In addition to minor differences between individual strains, there are now at least three major antigenic groups of influenza virus A which are recognized as distinct, as well as the swine influenza virus which has a group affinity to the human viruses. Minor antigenic differences have also been recognized among the influenza B group of viruses. Infection by one of the various influenza A group of viruses may produce a demonstrable cross-immunity against other groups but immunization, particularly with inactivated virus by the subcutaneous route, is much more strain-specific in its protective action.

THE DEVELOPMENT OF CONCENTRATED INFLUENZA VIRUS VACCINES

So long as the materials available for immunization were prepared from animal lungs, the possible vaccines were not only grossly impure but also weak in virus content. It was not, therefore, until a method of cultivation became available which yielded virus in a relatively cell-free medium from which it could be further concentrated, that potent vaccine became available for human use. The method of cultivation was that of growth in the allantoic sac of fertile chick embryos and Francis and Salk (1942), taking advantage of Hirst's observation that virus could be absorbed on to and eluted from fowl red cells, devised a simple method of purification and concentration of virus from such infected allantoic fluids. The resultant vaccine concentrated approximately tenfold from the original culture and inactivated by treatment with weak formalin is still the basis of commercial production.

Stanley (1945) showed that virus could also be concentrated from allantoic fluid by differential centrifugation but there does not appear to be any substantial advantage from the use of such a technique compared with red cell concentration. Purification has also been obtained by precipitation with chemicals such as calcium phosphate (Salk, 1945) or alum and the resultant complex of virus and insoluble precipitate appears to release virus antigen more slowly than do other vaccines when introduced into the tissues. The advantage of such a *depôt* of vaccine is that clinical reaction of a general character is dimin-

ished and the antibody response to the antigen may be somewhat prolonged. Whatever may be the relative merits of the various vaccines, the red cell eluate vaccine is the only one which has been subjected to extensive field trials and about which therefore any considerable amount of information has accrued. The major disadvantage of such a vaccine and indeed of all concentrated vaccines is expense. It takes *one egg* to produce a *single dose* of eluate-concentrated virus vaccine for subcutaneous immunization and this fact alone has severely curtailed the development and manufacture of influenza vaccine in Great Britain in the past ten years.

IMMUNIZATION IN MAN

Three methods have been used in studying the effect of influenza virus vaccines in man. These are, studies of the antibody response to the vaccine and of the factors which determine the degree and character of the response, experimental challenge of immunized volunteers by exposure to infection by inhalation, and field experiments during actual epidemics of influenza. A great deal of information is now available concerning the antibody response to subcutaneous immunization. It appears that formalin-inactivated virus is as potent an antigen as living virus by this route, that individuals vary in their response to injection of the same dose of vaccine, and that those individuals with pre-existing low levels of antibody and who include the most susceptible elements of the population develop increases in antibody content following immunization which are at least as good as those seen in natural infection. Individuals already possessing high levels of antibody may, however, show little response. The response to one dose of virus antigen is apparently maximal and repeated doses have no further effect in enhancing the antibody level already produced. The antibody response is chiefly dependent upon the amount of antigen contained in the vaccine, thus rendering a *potent vaccine a sine qua non of immunization*. Finally, the antibody response is highly specific in man as in animals. Vaccines made from the PR8 group of influenza virus A which was chiefly responsible for human epidemics between 1936 and 1943 are quite ineffective in producing antibodies against the A prime group of viruses which have virtually held sway since 1946 (Francis *et al.*, 1947). Unless therefore, the vaccine is polyvalent and contains the major A groups and influenza B, it is likely to be of limited value. Moreover, we have no certain information that all the various antigenic races of the influenza virus have yet been cultivated in the laboratory, so that future epidemics may well include antigen which are as yet unknown.

With virus strains resembling those incorporated in the antigen and used either for the deliberate inoculation of volunteers or encountered in field trials, significant degrees of protection following immunization have been demonstrated. Thus Francis and co-workers (1945) and Salk and colleagues (1945a) showed that inhalation of active virus in those previously immunized subcutaneously with inactive eluate vaccine was followed by a significantly lower incidence of infection than in controls. The duration of protection was, however, confined to a few weeks and protection was at its peak two to four weeks

after injection. The field trials organized in the U.S.A. by the Commission on influenza during and after the war extended this information in several directions. The classical successful trial of influenza vaccine was that organized in 1943 and reported by the Commission in 1944. Six thousand students in nine different centres in the U.S.A. were immunized and an equal number of alternate controls received egg materials without virus. The outbreak of influenza A which followed within two to four weeks exacted a toll of *clinical influenza* of 2.22 per cent in the vaccinated and 7.11 per cent in the controls. A reduction in incidence of approximately 70 per cent was thus obtained as a result of immunization. Only in the University of California was a less favourable degree of protection obtained and here the outbreak did not occur until six to twelve weeks after immunization.

A less elegant demonstration of the statistical significance of immunization and this time against influenza B was later reported by Francis, Salk and Brace (1946) and Hirst and co-workers (1947). The group incidence of influenza B in 1945-6 in naval schools where the students were not immunized was 10 to 12 per cent, compared with that of 0.5 to 1 per cent in neighbouring Army schools. As the schools were adjacent but the populations did not intermingle these studies are less satisfying than that in 1943. But the degree of reduction of infection was apparently greater and this may be due to the fact that the intermingling of numbers of immunized individuals with others who are unprotected may increase herd resistance to the spread of influenza and thus diminish the incidence in the controls. This effect may have been the reason for the failure of British experiments during the same influenza B outbreak (Dudgeon *et al.*, 1946) to establish the value or otherwise of the vaccine. For although several thousand medical students, nurses and industrial workers were then immunized, the incidence of influenza B was so low in most of the groups of the controls that benefit among those immunized could not be demonstrated (Table I). Only amongst industrial workers was an incidence encountered

TABLE I.—FIELD TRIAL OF INFLUENZA VACCINE 1945-46 DURING INFLUENZA B.
(GREAT BRITAIN)

Group	Number of centres	Number under observation	Cases of clinical influenza	Percentage incidence
University students	14	Vaccinated	1934	28
		Controls	2307	40
Nurses and patients in hospital	13	Vaccinated	1481	20
		Controls	1508	22
Industrial groups	6	Vaccinated	2157	84
		Controls	2173	140
Total	33	Vaccinated	5572	132
		Controls	5988	202

which was in excess of 5 per cent in the controls. In these, the immunized individuals suffered an incidence of influenza of 3.9 per cent, the control incidence being 6.4 per cent, but diagnosis was based upon the certification of ill-

ness in absentees and may therefore have been fallacious. Of these industrial groups, that at the Woolwich Arsenal included 622 controls and 609 immunized individuals and the respective incidence of reported influenza was 10.9 per cent and 5.1 per cent, a difference which seems unlikely to have been the result of chance.

Since 1946, many field experiments with influenza vaccine have been reported but none have been successful. This has been clearly demonstrated to be due to the replacement all over the world of the *classical PR8 strain* of influenza A virus and its close cousins, by a race of viruses which is antigenically distinct from the PR8 group and is now known as the *influenza A prime group*. The very lack of success with vaccines containing only PR8 antigen against natural infection by the A prime viruses and a similar lack of formation of antibodies against this race has thrown into sharp relief the successful experiment of 1943 and by contrast confirmed its truth. Meanwhile the new strains of virus behave so differently from the old classical strains that much of the immunology of influenza A must be re-written. The actual antigenic effect of A prime virus is, for instance, less potent than that of the PR8 group. Ferrets exposed to infection develop lower titres of antibodies, and thus it seems possible that inactivated virus vaccine made from the A prime viruses may be less active subcutaneously than that of the classical strain. The natural distribution of antibodies to the new strains is also different and the full significance of the antigen in relation to epidemiology is not yet known. Yet the A prime antigen stimulates in some individuals a formation of antibodies to the older virus both during natural infection (Stuart-Harris *et al.*, 1949) and during immunization. Fig. 1 shows the contrast between the serological response to two vaccines, the one composed only of PR8 virus antigen and the other of A prime antigen from the Dutch strain NED/1/49 recovered by Mulder and co-authors (Mulder *et al.*, 1949).

The rise of antibody to the homologous antigen is present with both vaccines and the PR8 vaccine has not induced an antibody response against the heterologous NED virus. But some of the individuals immunized with the vaccine containing the latter strain developed sharp antibody responses to the PR8 virus. This can only mean that the A prime virus contains in addition to its own specific antigen, some component capable of re-awakening antibody formation against the PR8 antigen. The derivation of the "A" prime viruses by mutation from the PR8 group is clearly suggested.

PROBLEMS FOR THE FUTURE

The present task in relation to immunization against influenza is clearly one of continued research in regard to a number of different problems. Now that we know that immunization is a theoretical possibility, all sorts of problems remain to be solved before the goal of practical utilization of vaccine can be glimpsed.

(i) *Character of the Vaccine*.—It is still not certain whether current vac-

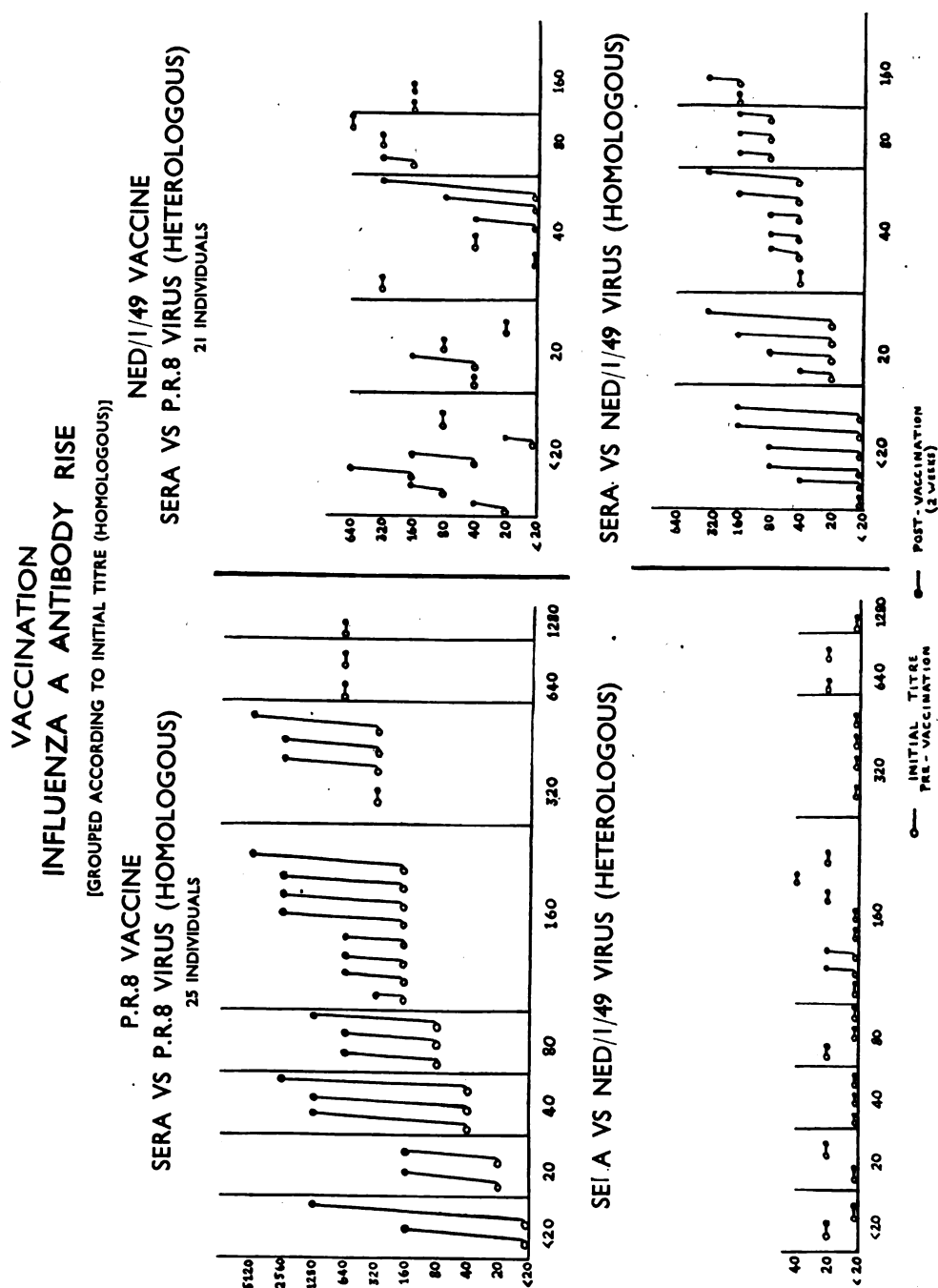


Fig. 1.

cines represent the most efficient and economical sources of antigen, and further research into methods of manufacture are clearly needed. In any case, however, the vital importance of a polyvalent vaccine containing all major antigenic groups is clear. Until we know how often major races of influenza A virus are likely to appear and disappear it will be foolish not to incorporate all those known to have caused major epidemics in the past.

(ii) *Avoidance of Reactions.*—Febrile reactions to the more highly concentrated influenza vaccines occur with a frequency bearing a relation to the antigenic content of the vaccine (Salk, 1948). In fact they constitute an annoyance hardly as great as that resulting from T.A.B. vaccine, but clearly the limit to the amount of antigen capable of being safely incorporated in the vaccine has been reached. The use of *depôt* substances in order to bring about a more gradual release of antigen is thus a significant development in diminishing reactions. In addition to febrile reactions, local reactions may be encountered though these are not of a serious character and a few instances have occurred of severe allergic reaction and even death in egg-sensitive individuals. Those who give a history of egg-sensitivity must therefore be tested by intradermal injection of a small dose and must not be given the usual dose of vaccine subcutaneously.

(iii) *Route of Immunization.*—Although nearly all past work has been carried out by immunization subcutaneously, American workers have recently introduced the intradermal route. The advantages claimed are twofold. Only one-tenth the amount of vaccine is used compared with the normal subcutaneous dose, and reactions particularly of a febrile character are minimal. Published reports (van Gelder *et al.*, 1947; Bruyn *et al.*, 1949; Rantz and Randall, 1949) of the antibody response to the small intradermal dose are reputed to be as good as or but little inferior to that following the larger subcutaneous one, but the data are still numerically small. Moreover, past experiments have been carried out with the PR8 antigen and a repetition of the work with A prime antigen is essential.

(iv) *Timing of Inoculation.*—Even the most optimistic observer must admit that the peak of protection afforded by immunization is reached two weeks after inoculation. The rise of antibodies does not begin until one week after inoculation, so that there is a lag in protection for at least this period. Whether significant protection lasts for several months after immunization, as some observers have claimed (Hirst *et al.*, 1944; Salk *et al.*, 1945*b*) or not is still a matter of doubt. Meanwhile it is clearly too late to begin inoculation in the face of an outbreak which is already in existence and yet it is undesirable to immunize too soon beforehand. Thus, accurate prediction of epidemics is much to be desired and if this is too Utopian a target, then a careful study of the spread of epidemics may enable immunization to be timed, in advance of the time of arrival of an outbreak. The work of the Influenza Centres of the World Health Organisation is an important development in this regard.

(v) *The Organization of Field Trials.*—It has already been stated that further trials are necessitated but only those who have participated in the organ-

ization of such trials are in a position to understand the practical difficulties. Trials necessitate the selection of a group likely to suffer a heavy incidence of infection, static enough for careful follow-up and capable of accurate clinical study during this period. For statistical reasons, the omission of immunization or the inoculation of inert materials in alternate controls in the herd is desirable. Yet if 50 per cent of the group are immunized, the incidence of infection in the controls may be cut down. The alternative method of immunization of complete groups of individuals and surveillance of comparable unimmunized groups is only likely to be satisfactory if the outbreak is uniform in a geographic sense and of an adequate severity (Mellanby *et al.*, 1948). Given a perfect vaccine, the correct antigen, an ideal human herd from the statistical standpoint, then all depends upon the disease influenza. As Francis said (1941).

"One of the chief obstacles to proper evaluation is the lack of co-operation on the part of the disease itself, in not presenting itself in the desired spot at the desired time." And may it be added "in as ferocious a form as possible."

CONCLUSIONS

Immunization with influenza virus vaccines is shown by experimental and field work to be both practicable and beneficial. Its application is handicapped by several factors including the variable character of outbreaks, the choice of suitable individuals, the unknown factors concerned with the requisite virus antigen and so on. It must still be visualized as an experimental procedure requiring much further work, though its value is more likely to be apparent during some future pandemic of possible high infectivity and severity than in influenza epidemics of the type recently experienced. The major difficulty of antigenic variation among the influenza viruses may frustrate attempts at prophylaxis based on viruses obtained from previous outbreaks.

Immunization and methods of air sterilization are therefore both measures of profound theoretical interest which lack practical application at the present time, but which are the only known weapons in the armamentarium of prophylaxis against influenza. They might be supplanted at any time by the development of some form of chemical or antibiotic agent which interfered effectively with the act of cellular infection of the respiratory tract by the influenza viruses.

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MAY I INTRODUCE STATISTICS ?

BY

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PART II

THE STATISTICAL SIGNIFICANCE OF MEANS AND OF DIFFERENCES BETWEEN MEANS

As we have seen already, we are nearly always working with samples of the population and not with the population as a whole. The means of such samples will differ to a greater or less degree from the mean of the population as a whole, but if the observations of the population as a whole are normally distributed so will the means be also. Even if the distribution of the population is not normal, that of the means of samples tends to be if the size of the samples is sufficiently large.

Usually we do not know the standard deviation of the whole population but have to estimate it from a sample. It can be shown that the standard deviation of means of samples of a certain numerical size, say N , would be approximately the standard deviation of our own sample, S.D., divided by \sqrt{N} and, further, that the true mean of the population is unlikely to be outside the value of the mean of the sample plus or minus twice S.D./ \sqrt{N} . The expression S.D./ \sqrt{N} is known as the *standard error of the mean*.

The precision of a single mean depends on the variability of the observed characteristics in the universe from which the sample is taken and on the size of the sample. The standard error of the mean has the same significance for the mean as the standard deviation has for the individual; in other words, it indicates the limits within which two-thirds of other means of equally large samples will lie, and some nineteen-twentieths of other such means will lie within the limits indicated by plus and minus twice the standard error. If the mean height of 100 recruits taken at random is found to be 170 cm., and the standard deviation is ± 6.5 cm., then the standard error of the mean is, according to the formula given in the preceding paragraph, $\pm \frac{6.5}{10} = \pm 0.65$ cm.

This means that further random samples of 100 individuals in the same population would have a $2/3$ probability of lying within the limits 169.35 cm. and 170.65 cm., and a $19/20$ probability of lying within the limits of 168.7 cm. and 171.3 cm. If repeated samples of 100 of the same population are made the means will be found to be along a normal curve with a standard deviation of ± 0.65 cm.

It is obvious that the standard error calculated on a large sample is determined with greater reliability than that calculated from a smaller number of individuals. The formula shows that the precision is directly proportional to the square root of the number. Thus if the number of the observations is quadrupled the standard error is halved. It will also be seen that a standard error calculated on a sample where the variability is small is more exact than the standard error calculated on an equally large sample where the variability is larger. Again it will be seen from the formula that the standard error of a mean is directly proportional to the variability of the individuals as expressed by their standard deviations.

The significance of the difference between two means is a determination of great importance which frequently arises, the problem being to decide whether there is a true difference between two observational means. In other words, is the difference between the two means such that they might have arisen by chance in random samples or do they indicate that the samples differ from each other in some essential characteristic?

If the number of observations in each sample is sufficiently large, say, at least 50, the significance, if any, of the difference between their means can be most easily determined by calculating the *standard error of the difference* between the means. This standard error is calculated from the formula:

$$\text{S.E. of the difference} = \sqrt{\frac{(\text{S.D.}_1)^2}{N_1} + \frac{(\text{S.D.}_2)^2}{N_2}}$$

where S.D.₁ and S.D.₂ are the standard deviations of the two samples and N₁ and N₂ the number of observations.

Thus we might find that the mean height of 6,000 successive National Servicemen in England was 67 inches, with a standard deviation of 2.6 inches, and the mean height of 5,000 successive National Servicemen in Scotland was 68 inches with a standard deviation of 2.5 inches. Could we say from these figures that the male population of Scotland as a whole is taller than that of England at the time of calling up, or is the difference merely due to chance as a result of unrepresentative sampling? If the observed difference, viz. one inch, is at least twice the standard error of the difference then it is unlikely that such a difference would have arisen by chance and there is a probability of at least 19/20 that the difference is representative of the population as a whole.

According to the formula, the standard error of the difference is, in this case:

$$\begin{aligned} \sqrt{\frac{2.6^2}{6000} + \frac{2.5^2}{5000}} &= \sqrt{\frac{6.76}{6000} + \frac{6.25}{5000}} \\ &= \sqrt{0.001127 + 0.00125} \\ &= \sqrt{0.002377} \\ &= 0.04875 \end{aligned}$$

The observed difference of one inch is, then, not only at least twice the standard error but is more than twenty times the standard error and it is therefore very unlikely that the samples have been drawn from the same universe. In

other words we could say Scotsmen are on the average taller than Englishmen at the age of call-up if our samples were representative of these age-groups as a whole.

When we wish to compare the means of samples of less than 50 observations we have to calculate a statistic known as t which is essentially the ratio of the difference to its standard error.

$$t = \frac{(\bar{X}_2 - \bar{X}_1) \sqrt{\frac{N_1 \cdot N_2 (N_1 + N_2 - 2)}{N_1 + N_2}}}{\sqrt{S(X_1)^2 - \frac{(S(X_1))^2}{N_1} + S(X_2)^2 - \frac{(S(X_2))^2}{N_2}}}$$

where N_1 is the number of observations in the first sample and \bar{X}_1 their mean, N_2 the number of observations in the second sample and \bar{X}_2 their mean (S means "the sum of" so that $S(X_1)^2$ means the sum of the squared observations in the first sample. $(S(X_1))^2$ the squared sum of the observations, etc.)

To take a simple example we might find that the scores obtained in an intelligence test given to two groups of school children were as follows :

Group I	3	5	6	4	3	3	4	
Group II	5	8	9	6	12	9	7	6

Does the difference between the means of the scores obtained by the two groups indicate a significant difference between the groups ?

For Group I :

$$\begin{aligned} N_1 &= 7 \\ S(X_1) &= 28 \\ S(X_1^2) &= 120 \\ \bar{X}_1 &= 28/7 = 4 \end{aligned}$$

For Group II :

$$\begin{aligned} N_2 &= 8 \\ S(X_2) &= 62 \\ S(X_2^2) &= 516 \\ \bar{X}_2 &= 62/8 = 7.75 \end{aligned}$$

Hence,

$$\begin{aligned} (1) \quad \bar{X}_2 - \bar{X}_1 &= 7.75 - 4 = 3.75 \\ (2) \quad \sqrt{\frac{N_1 \cdot N_2 (N_1 + N_2 - 2)}{N_1 + N_2}} &= \sqrt{\frac{7 \times 8 \times 13}{15}} \\ &= 6.97 \\ (3) \quad \sqrt{S(X_1)^2 - \frac{(S(X_1))^2}{N_1} + S(X_2)^2 - \frac{(S(X_2))^2}{N_2}} &= \sqrt{120 - \frac{28^2}{7} + 516 - \frac{62^2}{8}} \\ &= \sqrt{120 - \frac{784}{7} + 516 - \frac{3844}{8}} \\ &= \sqrt{120 - 112 + 516 - 480.5} \\ &= \sqrt{43.5} = 6.595 \end{aligned}$$

$$\text{Therefore } t = \frac{3.75 \times 6.97}{6.595} = \frac{26.1375}{6.595} = 3.96$$

Whether or not this value of t is significant is determined by reference to tables. The following table, Table V, gives the significant value of t for a probability of 0.05.

If, in our particular problem, the calculated value of t is greater than that given in the table for the appropriate value of n , then the probability of its having occurred by chance is 0.05 or less. In other words, the odds against its having occurred by chance are at least 19 to 1.

It is necessary to interrupt the story here to explain that " n " in the above table is not the same as N in the sample, but indicates what are known as the *degrees of freedom*

TABLE V.—VALUES OF t CORRESPONDING TO A PROBABILITY OF 0.05

n	t	n	t	n	t
1	12.706	11	2.201	21	2.080
2	4.303	12	2.179	22	2.074
3	3.182	13	2.160	23	2.069
4	2.776	14	2.145	24	2.064
5	2.571	15	2.131	25	2.060
6	2.447	16	2.120	26	2.056
7	2.365	17	2.110	27	2.052
8	2.306	18	2.101	28	2.048
9	2.262	19	2.093	29	2.045
10	2.228	20	2.086	30	2.042
				∞	1.960

available for calculating the S.D. In the case of a single mean, n equals $N - 1$. (This may be most easily explained by an example such as that of a father who has five sons; he stipulates in his will the amount to be given to each of the four younger sons, the residue to go to the oldest. There is obviously no "degree of freedom" in deciding how much the oldest should get; he gets what is left.)

In referring to Table V, n , in this case is $N_1 - 1$, i.e. the degrees of freedom in Group I, plus $N_2 - 1$, the degrees of freedom in Group II. That is to say that $n = N_1 + N_2 - 2 = 13$. The value of t in Table V corresponding to $n = 13$ is 2.160. The value calculated from the particular observations under consideration, viz. 3.96 is greater than that, so that the odds against such a difference between means having occurred by chance are more than 19 to 1. In other words, by ordinary standards, there is a significant difference between the scores obtained by the two groups.

(It will be seen that in Table V the values of n between 30 and infinity have been omitted. The value of t for $n = 30$ is 2.042, and for $n = \infty$ is 1.96. Accordingly, if one is determining the significance of the difference between means when n lies between 30 and ∞ , it may be said that if the calculated value of t is more than 2.042 the difference is significant, if less than 1.96 that it is not significant, and if it lies between these two figures that a full table would have to be consulted such as may be found in standard works on the subject of statistics.)

THE DIFFERENCE BETWEEN PROPORTIONS

Testing the significance of the difference between two samples in respect of the proportion of individuals in each who show a certain characteristic is a problem which very frequently arises in medical work and is perhaps best exemplified in the comparison between two groups to one only of which a certain line of treatment has been applied, the other acting as a control group.

For example we may have a group of 60 persons who have been inoculated against the common cold and find that over a certain period 9 of them did not suffer from a cold. In a control group of 40 we find that only 2 did not contract a cold. In other words 15 per cent of the inoculated group and 5 per cent of the control group remained free from colds over the same period. Is the difference likely to have arisen by chance or is it more likely that there was some other influence which has affected the result? Let us assume the hypothesis that they are in fact samples of the same universe in which the percentage of persons having no colds in the corresponding period is " x ." The nearest estimate we can make of " x " is found by summing our observations; thus 11 of the 100 persons under observation had no colds, so that 11 is the nearest we can approach to an estimate of the percentage of the population as a whole

who were free of colds. The question now becomes : If we take a sample of 60 and one of 40 individuals from a universe in which 11 per cent have no colds are we likely to get a difference of 10 per cent between the two groups instead of the expected difference of zero ?

The standard error of the difference between proportions is obtained by the formula $\sqrt{\frac{p \times q}{N_1} + \frac{p \times q}{N_2}}$ where p is the percentage of individuals in one category, in this case cold-free, and q the percentage in the other category, viz. who suffered from one or more colds.

In our present example the standard error of the difference is obtained thus :

$$\begin{aligned} \text{S.E. of the difference} &= \sqrt{\frac{p \times q}{N_1} + \frac{p \times q}{N_2}} = \sqrt{\frac{11 \times 89}{60} + \frac{11 \times 89}{40}} \\ &= \sqrt{16.32 + 24.47} \\ &= \sqrt{40.79} \\ &= 6.387 \end{aligned}$$

Our observed difference of 10 per cent, then, is less than twice its standard error and is therefore quite likely to have occurred by chance. Had the observed difference been more than twice its standard error we might have reasonably concluded that some definite cause had led to the magnitude of the difference ; if we were satisfied that the groups were strictly comparable in all other respects the results would have justified an opinion in favour of the vaccine.

CORRELATION

It frequently happens in experimental work that we wish to know to what extent, if at all, one variable is related to another. For example, we might wish to determine the extent to which height and weight are related in children of a given age. The most useful and theoretically satisfactory method of measurement is known as the "*product-moment*" method, by which the correlation coefficient, r , is calculated.

The coefficient of correlation always falls between -1 and $+1$. If r is $+1$, then there is complete "positive" association between the variables. Thus, in our example, such an association would mean that for each increase in height there was a constant increase in weight, the relationship being graphically represented by a straight line. If r is -1 there is a complete negative association, i.e. for each increase in one variable there is a constant decrease in the other. If there is no association between the variables, then $r = 0$.

The theoretical formula for calculating r is :

$$r = \frac{S(X - \bar{X})(Y - \bar{Y})}{N. \sigma_X. \sigma_Y}$$

where $(X - \bar{X})$ and $(Y - \bar{Y})$ are the deviations of corresponding values of X and Y from their means. In practice the simple theoretical formula is rarely

used. It can be shown, however, that r can be obtained from the following formula :

$$r = \frac{\frac{S(XY)}{N} - \bar{X} \bar{Y}}{\sigma X \cdot \sigma Y}$$

where XY is the product of each pair of corresponding variables, and $\bar{X}\bar{Y}$ the product of the two means.

The standard error of r is $\frac{1-r^2}{\sqrt{N}}$ and, as usual, r differs significantly from zero if it is more than twice its standard error.

Thus in the following example, Table VI, there are listed in columns I and II

	I	II	III	IV	V
	Arith.	Latin	X ²	Y ²	X Y
Pupil N.	X	Y			
1	3	1	9	1	3
2	9	8	81	64	72
3	7	4	49	16	28
4	8	10	64	100	80
5	4	6	16	36	24
6	1	5	1	25	5
7	6	5	36	25	30
8	9	3	81	9	27
9	7	8	49	64	56
10	8	7	64	49	56
11	5	2	25	4	10
12	4	6	16	36	24
13	6	5	36	25	30
14	5	9	25	81	45
15	2	4	4	16	8
16	6	5	36	25	30
17	5	7	25	49	35
18	4	1	16	1	4
19	6	3	36	9	18
20	2	5	4	25	10
	<hr/> 107	<hr/> 104	<hr/> 673	<hr/> 660	<hr/> 595

the marks gained out of 10 in tests in arithmetic and Latin given to each of twenty pupils. The problem is to calculate the coefficient of correlation between the two sets of marks. For this purpose three further columns are added.

Then :

$$\bar{X} = \frac{107}{20} = 5.35$$

$$\bar{Y} = \frac{104}{20} = 5.20$$

$$\left. \begin{aligned} \sigma X &= \sqrt{\frac{673}{20} - 5 \cdot 35^2} = 2 \cdot 242 \\ \sigma Y &= \sqrt{\frac{660}{20} - 5 \cdot 20^2} = 2 \cdot 441 \end{aligned} \right\} \text{ (see formula on p. 272)}$$

$$\frac{S(XY)}{N} = \frac{595}{20} = 29 \cdot 75$$

$$\text{Hence, } r = \frac{29 \cdot 75 - 5 \cdot 35 \times 5 \cdot 20}{2 \cdot 242 \times 2 \cdot 441} = 0 \cdot 353$$

Now, as we have seen, the standard error of r is $1 - \frac{r^2}{\sqrt{N}}$, that is

$$\frac{1 - 0 \cdot 353^2}{\sqrt{20}} = \frac{1 - 0 \cdot 124}{4 \cdot 472} = \frac{0 \cdot 876}{4 \cdot 472} = 0 \cdot 196$$

In this case r is less than twice its standard error, and therefore the calculated coefficient of correlation does not differ significantly from zero.

However, with small samples, the significance of the coefficient of correlation should be assessed by the t method. For r , $t = r \cdot \frac{\sqrt{N-2}}{\sqrt{1-r^2}}$. It is not, however, necessary to

calculate t for each determined value of r , as the significance of r can be assessed from a table such as that given below, Table VII.

TABLE VII
Values of r for $P = 0 \cdot 05$
 $n = N - 2$

n	r	n	r
1	0.997	14	0.497
2	0.950	15	0.482
3	0.878	16	0.468
4	0.811	17	0.456
5	0.755	18	0.444
6	0.707	19	0.433
7	0.666	20	0.423
8	0.632	25	0.381
9	0.602	30	0.349
10	0.576	35	0.325
11	0.553	40	0.304
12	0.532	45	0.288
13	0.514	50	0.273

It will be noted that in the above table, n , the number of degrees of freedom, is two less than N , the number of pairs of observations in the correlation (see note on "degrees of freedom" on p. 320). If the calculated value of r is as big as or bigger than the value in the table for the appropriate value of n , then the coefficient differs significantly from zero. In the above example, r was found to be 0.353. For $n = 18$, the value of r in the table is 0.444. We see again, therefore, that there is no real degree of association between the two variables. Graphs also exist, reference to which gives the actual P , or probability, of obtaining any calculated value of r for any given value of n .

If the values of X and Y are large, it will be seen that the amount of arithmetic required to arrive at Columns III, IV and V in the above method of calculating r would be considerable. A modification of the method is, however, available, by choosing arbitrary origins much in the same way as we did in calculating the mean of grouped frequency distributions.

For example, let us suppose that ten pupils were given tests in arithmetic and Latin, the possible marks being 50 and 200 respectively, and that the marks scored were as under :

Pupil No.	1	2	3	4	5	6	7	8	9	10
Arith. ..	19	25	17	20	26	30	29	21	23	24
Latin ..	145	151	140	144	138	140	142	150	149	150

The modified formula which may be used in this case is :

$$r = \frac{\frac{S(XY)}{N} - D_x D_y}{\sigma_x - \sigma_y}$$

where X and Y are the deviations of each of the actual observations from their arbitrary origins. $D_x = S(X)/N$ = the difference between the arbitrary origin and the true mean of X , and $D_y = S(Y)/N$ = the difference between the arbitrary origin and the mean of Y .

$$\text{Similarly } \sigma_x = \sqrt{\frac{S(X^2)}{N} - D^2} \text{ and } \sigma_y = \sqrt{\frac{S(Y^2)}{N} - D_y^2}$$

(cf. the formula on p. 000.)

For the arithmetic test a convenient arbitrary origin would be 25, and for the Latin test 145.

Thus :	X	Y	X ²	Y ²	XY
	- 6	0	36	0	0
	0	+ 6	0	36	0
	- 8	- 5	64	25	+ 40
	- 5	- 1	25	1	+ 5
	+ 1	- 7	1	49	- 7
	+ 5	- 5	25	25	- 25
	+ 4	- 3	16	9	- 12
	- 4	+ 5	16	25	- 20
	- 2	+ 4	4	16	- 8
	- 1	+ 5	1	25	- 5
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
	- 16	- 1	188	211	- 32

Then $D_x = -16/10 = -1.6$, and $D_y = -1/10 = -0.1$

$$\sigma_x = \sqrt{188/10 - 1.6^2} = 4.030, \text{ and}$$

$$\sigma_y = \sqrt{211/10 - 0.1^2} = 4.592$$

$$\text{Hence } r = \frac{-32/10 - (-1.6 \times -0.1)}{4.030 \times 4.592} = -0.159$$

Referring to Table VII, for $n = N - 2 = 10 - 2 = 8$, $r 0.632$. Again, therefore, the calculated value of the coefficient of correlation does not differ significantly from zero, and there is therefore no real association between the two variables.

When the number of observations is large, both the methods described may be laborious. The coefficient can then be calculated by constructing a correlation table. Further discussion of this and other methods is not within the scope of this paper. Likewise, it is intended to omit the method of estimating the significance of the difference between two coefficients and the calculation of coefficients of regression and correlation ratios.

CONTINGENCY : THE χ^2 METHOD

The methods described in the previous section for the estimation of the degree of relationship between two variables are only applicable where both

variables are continuous, that is to say that they are measurable by a notation in which each observation may differ from its neighbour by an infinitely small amount. Height, weight, blood pressure, etc., are examples of such variables. Frequently, however, in biological investigations the variables under examination are not measurable in this way and the various observations can only be allotted to categories. Examples of these are colour of hair, colour of eyes, whether or not an individual has been inoculated, whether or not he is protected by inoculation, and so on. To estimate the degree of association between variables such as these the method usually employed is known as the χ^2 method.

The χ^2 method is based on the determination of whether the number of observations falling within the various categories differ significantly from the number which would be expected on some hypothesis.

If O is the observed frequency which falls in a certain category and E the expected frequency on some hypothesis, then

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

In other words χ^2 is calculated by squaring the difference between the observed and expected frequencies in each category and dividing the result by that expected frequency, and then by adding all the resultant quotients.

The hypothesis usually assumed is that there is no association between the two variables. If the calculated value of χ^2 is, however, greater than that given for n , the degrees of freedom in the particular investigation, in the χ^2 table for a P of 0.05 (*see below*), then the hypothesis is disproved and there is a relationship between the two variables.

For example, we might be attempting to determine whether or not there is any association between hair colour and eye colour, each quality being divided into four categories. To determine χ^2 we should construct a contingency table. (The contingency table is analogous to the correlation table mentioned in the previous section.)

At the left-hand side of each "cell" we record the number of observations which fall into that column and row. For example there are 38 observations having both eye colour "I" and hair colour "I", and so on. The totals of each column and row are recorded at the foot of each column and at the right-hand side of each row. The combined totals of the columns and of the rows are the same, viz. 400, the number of pairs of observations.

The expected frequency for each cell on the hypothesis that the variables are not correlated is then calculated by simple proportion and inserted at bottom right-hand corner of each cell. For each cell this is calculated by finding the total number of observations in the column and in the row in which the cell is placed, multiplying these two totals together, and dividing by N , in this case 400. Thus in the top left-hand cell the figure 13.6 is obtained by multiplying 68, the total number of observations in Column I, by 80, the total number of observations in Row I, and dividing by 400, the total number of all observations.

Thus :

EYE COLOUR

		I	II	III	IV	Totals	(O—E) ² E
HAIR COLOUR	I	24.4 38 13.6	-11.2 20 31.2	- 4.8 16 20.8	- 8.4 6 14.4	0 80 80	43.776 4.021 1.108 4.900
	II	- 6.4 14 20.4	33.2 80 46.8	-13.2 18 31.2	-13.6 8 21.6	0 120 120	2.008 23.552 5.584 8.562
	III	- 7.8 16 23.8	-14.6 40 54.6	9.6 46 36.4	12.8 38 25.2	0 140 140	2.556 3.904 2.532 6.502
	IV	-10.2 0 10.2	- 7.4 16 23.4	8.4 24 15.6	9.2 20 10.8	0 60 60	10.200 2.340 4.524 7.836
							133.904
Totals		68 68	156 156	104 104	72 72	400 400	0

$$\chi^2 = 133.904$$

If we add up to the “expected” figures in each row and column, the resulting totals should be the same as those for the “observed” figures, and thereby furnish a check on the arithmetic. (It might be expected that these pairs of totals should be the same, as the “expected” figure in each cell is derived only by a redistribution of the total in each column and row on the hypothesis of non-association between the variables.)

Finally we insert in the top right-hand corner of each cell the difference between the observed and expected frequencies (O — E). If the values for O — E are added for each column and row the resulting total should be 0 in each case, giving one further check on the arithmetic.

The values of $\frac{(O - E)^2}{E}$ for each cell is calculated, as has been done to the right of the contingency table above. Thus 43.776 is $24.4^2/13.6$, etc. The value of χ^2 is then obtained by summing these values, and is, in this case, 133.904.

To determine whether the calculated value of χ^2 differs significantly from zero, we need first to know n , the number of degrees of freedom (*see* p. 320). For a contingency table consisting of r rows and c columns, n is $(r - 1)(c - 1)$. In the present example, therefore, n is 9. By reference to Table VIII, we see that

TABLE VIII
Table of χ^2 for different values of n
 $P = 0.05$

n	χ^2	n	χ^2	n	χ^2
1	3.841	11	19.675	21	32.671
2	5.991	12	21.026	22	33.924
3	7.815	13	22.362	23	35.172
4	9.488	14	23.685	24	36.415
5	11.070	15	24.996	25	37.652
6	12.592	16	26.296	26	38.885
7	14.067	17	27.587	27	40.113
8	15.507	18	28.869	28	41.337
9	16.919	19	30.144	29	42.557
10	18.307	20	31.410	30	43.773

the value of χ^2 for $n = 9$ is 16.919. The calculated value of χ^2 is greater than this, and so we can conclude that there is a degree of association between the two variables. (Other tables may be consulted which give the actual P for different values of n . In our present example, the probability of obtaining such a high value of χ^2 as 133.904 with n equal to 9 is so small that it would occur as a result of random sampling less than once in a million times.) The nature of the association between the variables is discovered by referring back to the contingency table.

If we do so, we can spot at a glance that those with hair colour "I" are most likely to have eye colour "I" and a diminishing likelihood of being in the eye colour categories "II," "III" and "IV." The corresponding relationship of the other categories of hair colour can be similarly observed.

(N.B.—In using the methods of contingency, the sample should be sufficiently large to ensure that the expected frequency in each cell is at least 5.)

Frequently the variables whose relationship is being investigated are each divisible into two categories only. In such a case the contingency table consists of four cells only and the need for calculating expected frequencies can be eliminated, and the arithmetic correspondingly simplified, by the use of the following method.

Let us suppose that a group of 85 were given a cholera vaccine during a cholera epidemic and of these 20 contracted cholera; another group of 75, similar in all other respects, were not inoculated and of these 50 contracted cholera. Is there a significant association between immunity from the disease and the inoculation?

First of all a contingency table is constructed.

	Inoculated	Not inoculated	Total
Did not contract cholera	65 (a)	25 (b)	90 (a + b)
Contracted cholera ..	20 (c)	50 (d)	70 (c + d)
Total	85 (a + c)	75 (b + d)	160 (a + b + c + d)

For such a 2×2 table,

$$\begin{aligned} \chi^2 &= \frac{(ad - bc)^2 N}{(a + c)(b + d)(c + d)(a + b)} \\ &= \frac{(65 \times 50 - 25 \times 20)^2 \times 160}{85 \times 75 \times 70 \times 90} \\ &= 30.13 \end{aligned}$$

As we saw previously n in the case of a contingency table is $(c - 1)(r - 1)$ where c is the number of columns and r the number of rows. With a 2×2 table, then, n is 1. By reference to Table VIII we see that for $n = 1$, $\chi^2 = 3.841$. Our calculated value of χ^2 is greater than this, so that there is a significant relationship between inoculation and protection. By reference to the contingency table we can see that the relationship is one which favours the use of the vaccine.

Finally we have the case where one of the variables is divided into more than two categories and the other into two only. χ^2 can be calculated by the method given at the beginning of this section, but again the calculation of expected frequencies can be avoided by the following method.

Let us suppose that we are examining the efficiency of four different batches of vaccine. A contingency table is constructed as before; thus:

	Batch A	Batch B	Batch C	Batch D	Total
Protected ..	36 (a.1)	42 (b.1)	30 (c.1)	12 (d.1)	120 (N.1)
Not protected	12 (a.2)	22 (b.2)	20 (c.2)	26 (d.2)	80 (N.2)
Total	48	64	50	38	200
	(a.1 + a.2)	(b.1 + b.2)	(c.1 + c.2)	(d.1 + d.2)	

For column A, we calculate

$$\frac{[(a.1 \times N.2) - (a.2 \times N.1)]^2}{a.1 + a.2} = \frac{(36 \times 80 - 12 \times 120)^2}{48} = 43.200$$

Similarly for column B, we calculate

$$\frac{[(b.1 \times N.2) - (b.2 \times N.1)]^2}{b.1 + b.2} = \frac{(42 \times 80 - 22 \times 120)^2}{64} = 8.100$$

For column C

$$\frac{[(c.1 \times N.2) - (c.2 \times N.1)]^2}{c.1 + c.2} = \frac{(30 \times 80 - 20 \times 120)^2}{50} = 0$$

For column D

$$\frac{[(d.1 \times N.2) - (d.2 \times N.1)]^2}{d.1 + d.2} = \frac{(12 \times 80 - 26 \times 120)^2}{38} = 122.779$$

χ^2 is the sum of those quantities divided by $N.1 \times N.2$

$$\text{Hence } \chi^2 = \frac{174079}{120 \times 80} = 18.1$$

In this example, on the same lines as previously, $n = (4 - 1)(2 - 1) = 3$.

By reference to Table VIII we see that for $n = 3$, $\chi^2 = 7.815$.

Our calculated value is greater than this, so that we may say that there is a significant association between the variables.

A glance at the contingency table shows that the proportion of those inoculated who are protected decreases progressively as we proceed from Batch A to B to C to D.

SUMMARY

In the introductory section the elementary mathematical basis of the subject was demonstrated and emphasis laid on the fact that *statistical significance* never amounted to *proof* but was an estimation as to whether one's findings were or were not likely to have occurred by chance.

The section on averages described the different kinds of averages which are used and showed how the *median* and the *mode* occasionally gave a more accurate picture than the *mean*. In that selection, too, the use of frequency distribution tables was shown and also the method of arriving at the *mean*, *median* and *mode* from such tables.

Measures of *scatter*, or dispersion, were defined in the next section, and methods of calculating the *standard deviation* described. There followed a short section on the *coefficient of variation* which showed how two or more variables could be compared as regards their scatter by calculating the coefficient of variation of each from their standard deviations.

The normal distribution was then dealt with, and its relationship to statistical significance explained. The following section showed the degree of reliance one could place on the mean of a sample as representative of the mean of the universe from which the sample was drawn, and two examples were worked out to show how the difference between two means could be examined to determine whether or not two samples differed essentially from one another.

The section on the *difference between proportions* showed how statistical method could be employed to investigate the effect of a line of treatment where a control group was available as a basis of comparison, and the following section on *correlation* described how the existence of a relationship between two *variables* could be determined.

Finally, the section on *contingency* showed how the χ^2 method could be applied to indicate the relationship, if any, between characteristics which could not be measured but where the individuals examined had to be placed in certain categories in respect of those characteristics.

CONCLUSION

The aim of the paper was stated in the opening paragraph, and it is hoped that it may have succeeded in attracting the interest of some who have previously neglected the subject because of some imagined difficulties in understanding its processes. It is a subject of great importance to all who undertake procedures of investigation and a knowledge of its elementary principles are essential to all who would wish to read critically any scientific paper in which the material is submitted to statistical analysis. No more than a few of the basic principles have been dealt with, but it is hoped that those who have read as far as this may have been stimulated to further their knowledge by reading one of the books on the subject which deal with it in greater detail, many being written in a style which makes them easily understood by the less mathematically minded.

ACKNOWLEDGMENTS

Principles of Medical Statistics. By Prof. A. Bradford Hill (London : The Lancet Ltd., 1948).

Statistical Calculation for Beginners. By E. G. Chambers (Cambridge : At the University Press, 1948).

Statistical Methods for Medical and Biological Students. By Prof. Gunnar Dahlberg (London : George Allen & Unwin Ltd., 1940).

In preparing this paper I have been greatly indebted to the above-mentioned books and am grateful to their authors and publishers for permission to borrow freely from them.

In particular, figs. 1 and 2 have been adapted from Mr. Chambers's work, and fig. 3 has been reproduced from that of Professor Dahlberg. In addition some of the examples have been adapted from Mr. Chambers's book, and Tables V, VII and VIII are quoted by him from the following works :

Statistical Methods for Research Workers. By R. A. Fisher (Oliver and Boyd 1936).

Statistical Tables for Biological Agricultural and Medical Research. By Fisher and Yates (Oliver and Boyd 1938).

I wish to express my thanks to Col. A. E. Campbell, Lt.-Col. C. L. Day, Major M. M. Lewis and Dr. R. B. Stalbow for much helpful criticism and advice.

SOME ASPECTS OF THE NATIONAL HEALTH SERVICE¹

BY

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THE National Health Service is an ideal towards which the consciousness of the Medical and Public mind has been developing over many years. With the expansion of medical knowledge, making it impossible for even the most brilliant mind to encompass the whole, the division of its various parts, perhaps now too finely decimated, makes it essential for some form of integration to take place. The various branches of Medicine appeared, until its inception, to be more interested in their own development with the general good of the public of secondary importance, but gradually Medicine realized its wonderful expansion within itself. Therefore under the National Health Service vitality has been given to the body, making sense both of individual endeavour in the field of research and of the obligations towards the public, so that there is a common aim, and the hope at last that the accent will shift from the cure to the prevention of sickness or, at least in part, and with the maximum of efficiency without overlapping.

To achieve this integration it is important that the constituent parts be aware that each is a member of a team and not merely working along individual paths whose direction takes little account of the surrounding country. My belief is that this is now being achieved and is based upon observations made in the course of training and practice as a surgical house officer in a general hospital followed by a term in the Army. Most of the time in the Army was spent as Regimental Medical Officer both in India and Palestine, with short periods as G.D.O. in hospitals. Following demobilization the next appointment under the Government post graduate training scheme was a House Officer in a large municipal hospital, and it was during this period that the Health Service was inaugurated. Thence the next step was to the present one of General Practice which has therefore been wholly under the scheme.

In these various positions it has been interesting to compare the co-operation and integration of the Services. In the hospitals any change is mainly in the administrative side and scarcely involved a junior, but in the medical

¹It is hoped to publish under this heading a series of articles by different authors who now have had the practical experience of practice under the National Health Service. The main difficulty in securing this series is to persuade competent medical practitioners that they have the ability, time, desire and sufficient energy to write an article for the Journal. Many half-promise but few actually produce. [Ed.]

departments there is little obvious change beyond the alteration in source of income and the names of the various grades of house officers. In hospitals there has always been a geographical integration and an easy access to use the various departments without overlapping. Again, in the Army, being an organism of mobility, the services must of necessity be integrated and adapted to make the greatest use of available facilities without redundancy and unnecessary overlap, and in such needs the sense of team work is bound to be strong. The R.M.O. can in this atmosphere feel and realize that the job he does, largely removed from operative and medical technicalities, is essential to the general working of the machine, and is indeed a job requiring special skill and knowledge. Behind him he knows well that there are departments to aid but which cannot, and do not seek to, by-pass him.

In general practice under the National Health Service the sense of team work appears now to be greater than previously and the practitioner's position comes more into line with the R.M.O.s, though the scope is rather wider in the medical sense since the conditions of the material and environment are different. But here again there are the specialized departments lying behind him with easy access to them. Pathological services are very good having been brought more into line with the co-operation which can be obtained in hospital; blood-counts, swabs, tests of all sorts and advice on their interpretation are easily obtained and done far more accurately than it would be possible for the practitioner to do himself with the increasing tempo and limited time of practice. Consultant services in domiciliary practice can be obtained easily and often prove most valuable in difficult cases: I have always found the consultants ready and willing to help or suggest alternative diagnoses at any time of day or night. It is with a great sense of relief that one can ask a consultant to see either at home or in outpatients a patient whose financial position would have precluded him previously from the best treatment. In one particular case three consultants saw a patient for me since his lesion was a particularly obscure one; all came gladly and with infinite patience examined him before discussing his case with me in relation to his previous history, since my longer observation of him at home would help in the general assessment of his nature. Other services are equally available and for the same reasons most acceptable for impecunious patients, such services include ambulance services, nursing services and surgical appliances.

Further, with greater co-operation possible under the National Health Service it has enabled many practitioners to amalgamate into firms or with the aid of Government grants to take on Assistants giving the obvious advantages of proper off duty times and a possibility of relative specialization by the individual practitioner. Rest and recreation time, when one can be assured of freedom from calls knowing they are in safe hands, are very important considerations when the pressure of work becomes as acute as it does during the winter months. With time off there comes more chance to read medical journals and visit hospitals, to read and to discuss, so that the slur that practitioners never open a book once qualified or keep up to date can

be counted as false. Relative specialization by the various members of a firm of practitioners is also a possibility and in my opinion a chance to be welcomed since it increases considerably the interest and skill of that practitioner, thereby raising the standard of the service given. Unfortunately there is a distaff side to this under the present scheme of the National Health Service, in the lack of facilities available, but this will be discussed later. For this latter reason and for the reasons that there are always night calls and the personal preference by a patient for a particular doctor, it is very unlikely that he would become so specialized as to cease to observe his patient as a whole: a stigma, perhaps not frequently justified but certainly levelled at specialists today.

The ready and easy access to the various departments by general practitioners tends to militate against itself and the practitioners. It is obvious to those who have worked in hospitals since the birth of the National Health Service that much material which reaches the hospitals should not have done so, since the necessary procedures could as easily have been carried out at home or in the surgery. For example: circumcisions, abscesses and whitlows can easily be done in the surgery; feeding problems of children, where the cause is probably a nervous mother and the need a little understanding; and a sprained ankle because it was done at work and visions of a claims court demand an X-ray, crowd the casualty and out-patients departments. Several causes are at the root of this problem but four main ones are discernible. Firstly and most obviously is the ease with which it can be done, making it simple for those of a lazy turn of mind to do. Secondly, the appalling half education of the public by the daily and other papers wherein great prominence is given to treatment by specialists, new modes of cure still hot from the research laboratory and probably incompletely investigated to date and mentioned in the *medical* press only as preliminary statements, and the importance of X-rays. All these are constantly being brought before the public which soon presses its doctor for them. The importance of X-rays plays a very large part in the public's mind, from a twisted ankle to the early diagnosis of cancer; the unspoken request in a mother's attitude, when dear Emma has had a cough for a week which no medicine will cure, is only too obvious, and who can blame a practitioner, with thirty or forty other patients in the surgery-waiting-room and a long visiting list, from writing out a slip for an X-ray rather than persuade the mother that it is likely to cost the country an unnecessary guinea and it is too early anyway to worry.

Thirdly, in the more obvious causes for crowding in the hospital departments, is the fact that however willing and skilful he may be, doing a minor operation costs the practitioner both time and money since he must supply his own instruments, material and anæsthetic. Under these conditions and even though it is included under his contract to the patient "to do everything within his power to treat him," it is human nature to send the cases to hospital. This is both sad and bad, since too often the skills once developed so carefully and lovingly atrophy from disuse and there is no incentive to

improve with the result that inefficiency and worse still, boredom and cynicism creep in. Fourthly and in corollation with the third reason, is the fact that much of the teaching of students, at least of the younger and more recent generations stresses how difficult and dangerous it is to do many of the operative procedures, from anæsthetics to obstetrics, outside the ideal conditions of a hospital; with the result that the practitioner is hesitant to embark upon new skills outside the ones he has been fortunate enough to develop during his hospital appointments.

The net result of this overcrowding is to reduce even the specialists to glorified practitioners with rather better facilities for doing things. Their time becomes severely limited also and diagnosis becomes hurried, though it is likely to be more accurate than the practitioner's from sheer experience in that particular subject; whereas the specialist services, including pathological, should have sufficient time for consideration and consultation over the more difficult problems which experience and long acquaintance alone can elucidate. They should in fact be behind the practitioner and not overlap or by-pass him. The only solution, therefore, is to make sure the practitioner has more time for un-hurried diagnosis, more time for treatment say, in a wider field than the pure specialist but much narrower than at present, and with more facilities for simple treatment and the less complicated pathological tests. This ideal is presumably envisaged in Health Centres but is as yet only an ideal in most areas.

As I have said, the practitioner can in many cases be blamed for causing unnecessary admission to hospital; but his time under the National Health Service has become severely limited, necessitating often a hurried diagnosis and inadequate observation. The lack of time is perhaps the greatest drawback, leading to complete mental exhaustion to the point of absolute drying up of sympathy. He may sustain a severe mental battering from the profusion and diversity of complaints met with during a long surgery. This is unlikely to lead to efficiency, though powers of adaptation and long experience can raise the threshold of a break of temper. In such situations a sense of humour is obviously an asset, though much will depend on the level of the blood sugar.

The number attending a surgery has risen steeply due to many causes. from the genuine illness long overlooked or ignored because of financial consideration, which alone would justify the National Health Service, to getting something for nothing and the attitude "I pay my four and sixpence a week so why shouldn't I have a free lot of aspirin or liquid paraffin." Or again there are the old chronics who finding there is a new doctor at the surgery come along to see if they can persuade him to give them something new for their "Bronics." The result is that one has to consider for example, not only the major causes for a headache but also all the minor as well, from a badly ventilated room to a tight collar. Some complaints require a sense of humour to deal with or one's sanity would be in serious danger: amongst these is the perennial—"Doctor I feel run down and as I was passing the surgery I thought I would just come in to get a tonic." and then in justification go on

to say how much good "that tonic you gave Aunt Minnie" did her and it was probably Mist Rhei Co.

Visiting patients at home has risen to a smaller degree than the numbers attending a surgery and, although such things as heavy rain and snow will make more send for the doctor rather than attend the surgery themselves little real abuse has been encountered, though it does occur. The general scope of the Health Service has eased the visiting problem; there is now no longer any fear of financial embarrassment to a patient by the number of times it may be necessary to visit him, while again many really useful items are obtainable for treating a patient at home. Oxygen therapy; expert nursing by the Queen's Nurses who are invaluable for giving daily injections, as for example Pencillin; wheel chair and home X-rays are amongst the services that a practitioner can call upon to aid him. It should not be forgotten, as has already been mentioned, that expert advice and help from consultants and the pathological service can be obtained at any time of day or night, equally without the burden of extra cost to the patient. The service has been of great value to those of the middle income groups who had enough money to deal with the occasional prewar visit by the doctor but to whom this would now be seriously embarrassing: unfortunately the pride in some often deters them from attending the surgery while a visit at home tends to conform to the prewar practice of a long chat touching incidentally upon the complaint at issue. Time shortage makes such visits arduous.

Prescribing too has brought its headaches since it is so open to abuse on both sides. It is often quite obvious that a visitant to a surgery has no other object in view than that of obtaining something previously bought of the chemist without thought of seeing a doctor; the result is to increase the cost to the service in an unnecessary way. On the other side overprescribing by the doctor is perhaps all too frequent, or the prescription of a trade preparation when its equivalent is in the *National Formulary* of approved drugs. Much as the doctor is publicly minded to reduce the cost, especially when the drug could as easily be bought by the patient, it is human nature to take the easy course of prescribing it rather than arguing the point; since to do so may endanger the doctor's livelihood by the loss not only of that particular patient, but also his family and relations. Secondly of course it is a great deal easier to write a trade name and to remember it, rather than a long title of some approved equivalent N.F. preparation. This might be obviated, as has recently been suggested, by the printing on the prescription form a statement to the effect that if there is a N.F. equivalent the chemist should dispense that instead. The other alternative is the one already partially carried out by the Cohen Committee wherein certain preparations, especially those advertised to the public direct, are stated to be non-prescribable, in which case it can be stated to the patient that this is so. This, however, may be the beginning of virtual dictatorship in prescribing from above, though it should be stated in fairness that the Cohen Committee was reluctant to limit the prescription of trade prescriptions where the doctor felt it to be justified.

Certification is one of the necessary camp followers of such a bureaucratic machine as the Health Service and has to be accepted as a necessary evil. This, however, does not make it any more welcome as it considerably increases the quantity of work and donkey work at that, which has to be done. One of the effects of this is to make the doctor's writing degenerate into a mere scrawl, decipherable only by the chemist. Certification can assume the role of a major hate as far as a doctor on his rounds is concerned, since it is the thing that is invariably forgotten until the black bag is packed and hand is on the front door. "Oh doctor you forgot my certificate for the National Health," "Oh and could I have one for my club (Deposit Society so important to a working man prior to National Insurance)." And as a last straw—"Doctor don't you think I would get better more quickly if I had extra milk and eggs." This means at least three certifications in all.

Much has been written about the faults of the National Health Service and it is a thing easy enough to criticize from many angles; but this is liable to occur in any new Service, especially when the experiment is set in motion without considering other examples of the same experiment elsewhere. To correct these faults is perhaps not so easy, but of the remedies necessary to make it more workable and worth while from the practitioner's point of view there are two main considerations.

Firstly the alteration of financial conditions in order to reduce the anomaly of excessive work necessary to secure a living by someone whose working hours are not fixed to 40 hours a week. The size of the salary is directly dependent upon the number of the patients on a list with the object of allowing the better doctor to make more than the lazy one; but, with the present size of the capitation fee, the number necessary is too large for satisfaction in service given. The raising of the capitation fee for each patient in order to reduce the large lists is an obvious solution. Secondly there is the remedy of increased facilities available to local practitioners, from operation to minor pathological facilities. Too often one feels as a practitioner, that the role at this level of the service is that of distributing agent of the material passing under one's attention into various departments of hospital, so that it is probable that one's worth is assessed on the fewest mistakes made in this allotment into pigeon holes. The practitioner cannot follow his patient through the various stages of treatment and his invaluable knowledge of the patient at home in natural surroundings under all conditions is seldom requested.

It is surprising how little the person involved is informed by those in charge of him about his condition and the need for a particular line of treatment. The result is that he has to turn to his doctor for guidance and explanation, though it is admittedly true the withholding of information is perhaps occasionally necessary. Obviously much has to be done by specialists in techniques for which the practitioner has no training and with which he does not wish to interfere, but there is room for use of practitioners in assessing a case or again in making available facilities for them to do minor work, especially in the lines of midwifery, children and many minor diseases such

as skins. The older practitioner has had much experience in midwifery and children and prior to the National Health Service could advance his knowledge sufficiently to be totally adequate in an appointment at a local hospital. Unfortunately under present conditions he must be either a practitioner or a complete specialist, there is no half-way house, and should he wish to turn from one to another he must revert back to the lowest grade in that particular branch; an obstacle almost insuperable from the financial aspect. This is in direct contrast with the Army, where promotion and specialization can follow from the initial grades without such financial worries.

The prospect then from the general practitioner's point of view is a mixed one. There are many things to be thankful for, from the wonderful ease in obtaining help to the lack of financial worry to the patient, and some which lead to a fierce sense of frustration; but, whatever may be the considerations of Medical Politics he is always rescued from frank cynicism by the love of helping people and a genuine pleasure in meeting them, since the majority are deeply grateful for all that is done for them.

SYMPTOMLESS CONGENITAL HEART BLOCK WITH HYPERTENSION

BY

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PTE. A., aged 18, of normal build and physique, was admitted to hospital 20.3.50 subsequent to the finding of a marked hypertension. His only complaint had been a nose bleed on parade similar to one he had had one month previously.

He had no headaches, no breathlessness, no history of any previous illness either in childhood or adult life. No history of rheumatism, diphtheria, etc., etc., and the family history was normal. He had passed satisfactorily his Assault and P.T. Courses, both gruelling tests of endurance. He played football and liked games. In short he gave no history whatsoever suggestive of a pathological condition of any kind, and it was only because I had on one previous occasion found hypertension in a case of hitherto unexplained epistaxis that I took his blood-pressure and subsequently made a complete cardiological examination.

On Examination.—Pulse-rate at rest about 40–45. NO cyanosis. NO “clubbing.” Lungs clinically N.A.D. I found the aortic and mitral 2nd sounds accentuated but no thrill and no murmurs.

Blood-pressure was 190/90 and remained substantially the same after several checks in the recumbent position.

Urine: N.A.D. Abdo: N.A.D. Blood examination: Hb 14 grm. per cent. R.B.C. 5,450,000. Wassermann negative. *X-ray.*—Lungs clear.

Heart within normal limits. Some accentuation of (R) border of heart, probably some degree right sided enlargement.

The EXERCISE TOLERANCE TEST was good. The electrocardiogram shows that there is a complete heart block with complete dissociation of the P. and QRS complexes with some biphasic distortion of the QRS complex in Lead (1).

The “T” wave was normal in all leads except when coincident with the aberrant P wave.

The pulse-rate increased only from 50 to 54 on exertion.

The electrocardiograph after exertion is identical, except for the ventricular rate, with that taken before exercise.

SUMMARY

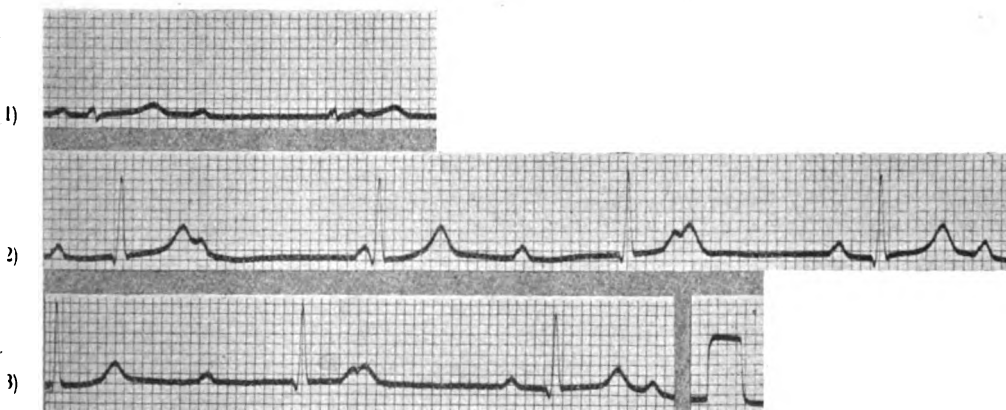
(1) This is almost certainly a case of congenital heart block with hypertension.

ELECTROCARDIOGRAM OF CASE A

AT REST



AFTER EXERTION



(2) There is perfect compensation and the heart muscle is healthy.

(3) There is a complete lesion of the bundle of Hiss which points to a defect in the interventricular wall.

(4) There is no evidence whatsoever to point to an infective cause.

This is most certainly a case of congenital heart block with, or possibly due to, an appreciably large defect in the interventricular septum without, however, any degree of cyanosis. It would appear that the heart has perfectly compensated itself and the circulation is satisfactorily maintained by means of an increased blood-pressure.

Conclusion.—No treatment is indicated but this is not the biggest difficulty in this case. One is faced with the alternatives of:

(1) discharging the patient from the Army as an invalid with perhaps unpredictable psychological consequences, and with a resultant unnecessary limitation of activity in a life which may have quite a normal expectancy; or

(2) merely telling him that he has an interesting heart, NOT heart disease or a weak heart both of which he demonstrably has NOT, and allowing him to continue his service in the Army to be discharged in due course merely with a note as to his cardiac condition. He has therefore been merely downgraded to P.3, violent exertion limited, and is to be kept under observation.

It would seem likely that there have been similar cases which have never been diagnosed, due to the lack of symptoms and the fact they may never have had a complete cardiac examination, e.g. in normal civil life. It is a moot point as to whether they are not the better off for that. However, there may be borderline cases in which the heart is compensated only just so far as is necessary for a normal quiet life without any violent or sustained exertion. The danger of breakdown in these cases especially when recruited in the Armed Forces is very real, and it might appear desirable that every recruit should have a blood-pressure recorded on first examination and doubtful cases referred immediately for a complete cardiac examination.

STUDIES ON URINARY CARRIAGE OF ENTERIC GROUP ORGANISMS

FROM THE CENTRAL PATHOLOGY LABORATORY M.E.L.F.

I. Quantitative Evaluation of Methods for the Concentration of Enteric Group Organisms in Urine

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The extension of studies on Urinary Enteric Carriage in Egypt, and the aspects of such carriage which would receive particular attention were announced in an earlier paper in which two cases exemplifying many of these aspects were described (Archer, Bangham, Dunbar, and Ritchie, 1950).

With reference to the number of organisms passed by carriers, it was then suggested that it was desirable to determine whether a concentration method is necessary to avoid missing the presence of organisms when scanty.

Though the presence of bacteria in enormous numbers is common, Ashton (1947) found only 2 per ml. in one carrier, and a case in which only about 12 organisms per ml. appeared to be present on one examination was noted during the current investigation. It was therefore considered desirable that a suitable concentration method should be used in parallel with simple direct culture of a small volume (loop or swab) for a considerable time to assess the need for such a technique. The investigation here described was carried out to determine the best concentration method to employ.

Available Methods.—Ashton (1947) refers to the following available methods:

- (a) Seitz filtration with use of the pad on which the organisms have been retained as an inoculum.
- (b) Enrichment of the urine by adding the ingredients of a selective medium.
- (c) Trapping the organisms in a colloidal precipitate.
- (d) A combination of (a) and (b).

To these might be added:—

- (e) Simple fluid culture of the urine, with or without the addition of a suitable medium, followed by selective plating.
- (f) Centrifuging of each specimen.

The Present Investigation

Experiments were carried out to test the efficiency of most of these methods quantitatively. Urine containing a known number of organisms was prepared by diluting carrier-urine the bacterial content of which had been determined, or suspensions of stock cultures, in sterile filtered pooled urine to the degree required for the test in hand.

Pathogens used were: *Bact. typhosum* as passed in urine of carrier Z. H. H.: *Bact. typhosum* TY2; *Bact. paratyphosum* A as passed in urine carriers I. S. A. and A. W. M. Y.

Media used included: *Selenite media* from the R.A.M. College and the Media Manufacturing Centre, B.B.L. dehydrated, and locally prepared. *Tetrahionate broth* prepared to formulæ of Hynes (1942) and of Rolfe (1946). *MacConkey fluid medium* and a modification of this medium containing Mannite instead of lactose as the fermentable carbohydrate.

Counting Methods used were: Either a plate method or a fluid culture method. For the former the fluid, the viable bacteria in which were to be counted, was serially diluted. Drops of subsequently determined volume of these dilutions were delivered on to the surface of plates of agar or other suitable medium. The plates were incubated, a dilution showing colonies which could be readily counted was chosen, and a count made of those which had developed from 4 to 8 drops. From this the content of the original fluid was calculated. For the fluid culture method liquid media were inoculated with the fluid under investigation using the numbers of cultures, and the volumes of inocula, necessary for the use of McGrady's tables in estimating the number of viable organisms present.

Our results are reported below.

I

QUANTITATIVE TESTS ON THE USE OF SEITZ FILTER PADS

This method is wasteful of time and material if used on separate specimens, or even on a pool of all the specimens considered necessary to be examined from one individual. The primary purpose for which it was advocated was the investigation of pooled urine from many individuals, and the subsequent examination in detail of the urine of those persons who had contributed specimens to a pool from which a pathogen had been isolated. Thus, as Walton (1949) points out, the advantage of the method as a labour saving technique is problematic unless the percentage expectation of positive specimens in the population under investigation is low. Otherwise the re-examination in detail referred to above becomes too frequently necessary. The number of positive pools can of course be greatly reduced by the elimination of specimens from heavy carriers by a preliminary screening test of simple direct culture on plates, but it was precisely to avoid such multiple plate cultures that the application of the method to urine pools was first advocated. Other minor disadvantages are the apparent need to pre-treat the Seitz pads with killed *Bact. coli* to limit adsorption and inhibition of the living organisms filtered out from the urine (Ashton), and the need to

maintain duplicates of the samples pooled to which to refer back. The alternative of reference back to the person concerned for a fresh specimen may be unsuccessful if carriage is intermittent or transient. Such unsuccessful examination of repeat specimens has been reported. It gives rise to difficulty regarding future action concerning the persons whose urine was contained in the positive pool.

Since Ashton has already reported a thorough study of this method and assessed its value, our investigation was limited to a small number of tests having the following objects.

- (1) To determine quantitatively the reduction in viability produced by the untreated filter pad.
- (2) To assess and examine any additional effect on the recovery of organisms from the specimen filtered produced by the medium used for pad culture.

Materials used:

Bact. typhosum (Z. H. H. and Ty2) and *Bact. paratyphosum* A (I. S. A.)

Selenite medium (R.A.M. College and B.B.L.)

Broth and fluid MacConkey medium (containing lactose, and modified by substitution of Mannite for lactose).

Experiments and Results.—(a) Filtration of 90 ml. Z. H. H. urine (contents 20×10^6 *Bact. typhosum* per ml. approx.) followed by pulping in broth of the filter pad used, yielded a recovery of an estimated 6 per cent of the organisms originally present. This was demonstrated by a plate viable count.

(b) The following approximate numbers of *Bact. typhosum* were deposited on filter pads by filtration of Z. H. H. urine appropriately diluted in sterile urine. The filter pads were pulped in different media and incubated with the results shown:

From 20—60 organisms pulped in broth growth occurred

From 12—20 organisms pulped in broth growth occurred

From 12—20 } organisms pulped in selenite media (R.A.M. College) no growth
From 35—60 } had occurred after six days

From 350

From 25 organisms pulped in fluid MacConkey medium growth occurred

It is thus apparent that, even if there is considerable reduction in viability when large numbers of living organisms are trapped in a Seitz filter pad, survivors are still present if quite small numbers are so trapped. It is also evident that the medium used from the cultivation of the trapped organisms may have an important influence on their apparent viability.

(c) 25 ml. of urine of I. S. A. containing *Bact. paratyphosum* A was filtered through a Seitz pad. The same volume of urine was passed through a similar pad which had been previously used to filter a suspension of about 35×10^9 dead coliform organisms. Both pads were mashed in 25 ml. broth. Viable counts were carried out on the urine and on the two broth suspensions by the plate method.

Result:

Control count on urine	...	...	750,000 per ml. (approx.)
Broth mash of untreated pad	...	...	440,000 per ml. (approx.)
Broth mash of coli-treated pad	...	...	980,000 per ml. (approx.)

(d) I. S. A. urine was diluted to contain about 100 *Bact. paratyphosum* A in 70 ml. (on the basis of a previous estimation of the number of viable organisms this carrier was passing) and 70 ml. was filtered through a Seitz pad. A further 70 ml. was filtered through a pad previously treated with about 15×10^9 dead coliform organisms.

Both pads were mashed in 70 ml. broth. The number of organisms in the diluted urine and in the two broth suspensions was determined by a fluid culture count in "Mannite-MacConkey."

The control count on the diluted urine was 130 *per 100 ml.*

The count on the broth mash of the untreated pad was 50 *per 100 ml.*
(i.e. 35 on the pad)

The count on the broth mash of the coli-treated pad was 170 *per 100 ml.*
(i.e. 119 on the pad)

It seems clear from these experiments that even quite small numbers of organisms may only show a relatively slight diminution in the numbers surviving on a Seitz filter pad, since in experiments (c) and (d) the fall in numbers was only 40 per cent to 60 per cent. This figure is very probably within the limits of experimental error of the methods used, though it may be noted that viability was 100 per cent when pads were pre-treated with dead coliform organisms as advocated by Ashton.

An attempt was made to determine if the apparent loss of viability on filter pads was entirely due to an inhibitory action of the culture medium inoculated with the pad; if any such inhibitory effect was enhanced by the presence of the mashed pad; and if such inhibition was reduced by the presence of dead coliform organisms.

(e) 30 ml. quantities of selenite medium (B. B. L.) were filtered through two Seitz pads which had previously been used to filter a suspension of 40×10^9 dead coliform organisms, and saline, respectively. Each of the Seitz pads was then pulped in 30 ml. of the same medium.

Four preparations of selenite medium were so produced:

- (i) Seitz filtered selenite medium.
- (ii) Selenite medium filtered in contact with dead coliforms.
- (iii) Selenite medium containing pulped asbestos.
- (iv) Selenite medium containing asbestos and dead coliforms.

These four preparations in 2 ml. amounts were inoculated with falling dilutions of a suspension of *Bact. typhosum* (Ty2). None produced any inhibition.

Conclusions.—The fall in viability of enteric group organisms on Seitz filter pads described by Ashton may only be slight (of the order of 50 per

cent even with small inocula). It is confirmed that pad pretreatment with dead coliform organisms prevents any loss of viability on the filter pad.

A great loss of viability appears to be produced by inoculating the pad into an inhibitory medium. Selenite media may have this effect, but attempts to determine any action of filtration, asbestos, or contact with dead organisms, in enhancing or reducing the inhibitory effect of this medium were unsuccessful, since the batch of selenite used for such experiments was, and remained, uninhibitory.

II

THE USE OF FLUID ENRICHMENT

In these experiments enrichment media were used, diluted, in normal strength, or concentrated. Concentration when used was such as to produce a medium of normal strength on dilution by the inoculum of urine.

The method can only be of value if other urinary flora are so abundant or prolific as to be likely to obscure the presence of pathogens if primary culture in simple fluid media were to be employed. The narrow working limits between selective and non-selective inhibition (Moore, 1950; Rolfe, 1946) is also likely to restrict the value of fluid enrichment.

The two media investigated were *selenite medium* and *tetrathionate broth*.

A.—SELENITE MEDIA

MATERIALS

Medium: Locally made, R.A.M. College, B.B.L.

Strength: Full strength (i.e. double strength diluted with an equal volume of urine inoculum), half strength, and quarter strength.

Diluents: Urine (inoculum) only, or with peptone water, distilled water, saline, or further sterile urine, added.

Organisms: *Bact. typhosum* (Z. H. H. and Ty2); a coliform strain.

METHOD

Inoculation: Inocula consisted of serial dilutions in filtered urine of Z. H. H. urine, or of suspensions in urine of *Bact. typhosum*, Ty2 or the coliform species. The latter were prepared from primary suspensions the bacterial content of which had been estimated by comparison of opacity with Brown's tubes. (Approximate knowledge of the bacterial content of suspensions to be diluted was necessary in order that mixed inoculum should be in suitable proportions and the end-point for dilution be appropriate.) Viable counts were made by the plate method. Selenite was inoculated by the addition of an equal volume of each dilution of bacterial suspension to one of a series of volumes of medium. Medium of double and of single strength was used. In certain tests there was further dilution with two volumes of peptone water, distilled water, saline, or filtered urine. In two tests on mixed inoculum a series of falling numbers of *Bact. typhosum* were associated with a large fixed dose of coliform organisms. In other mixed tests serial dilutions of each species were combined to produce a series of inocula of falling bacterial content in which the ratio between the species present remained constant.

Incubation and Subculture: Incubation was at 37° C. Quantitative subcultures were made after six and twenty-four hours by plating of drops of subsequently determined volume to agar. MacConkey's agar was used in addition when indicated.

The early subcultures were carried out to indicate any considerable degree of death of the inoculum before such an effect could be masked by multiplication of survivors. The later subcultures were made to determine the smallest number of organisms from which adequate multiplication had occurred. An abrupt transition in a series of subcultures from a confluent growth to complete absence of growth was considered as indicating complete death of the inoculum from which the sterile subculture was derived. A gradual fall in numbers of colonies on subculture throughout a series, which was proportional to the viable count on the falling series of inocula, would suggest inhibition rather than death of the inoculum.

Experiments Performed:

28 experiments were made—of these:

18 were made on *Bact. typhosum* (15 Z. H. H. and 3 Ty2)

4 on the coliform strain and

6 on mixed coli and typhoid.

10 experiments were made with the locally prepared medium, 6 with R.A.M. College medium and 12 with B.B.L. medium (in two of the latter the tests were carried out on *Bact. typhosum* under anaerobic conditions, and in two others on this species after filtration of the medium). In 13 observations the medium was used at full strength after inoculation, in 6 others the strength was $\frac{1}{2}$, and in the remaining 9 it was $\frac{1}{4}$.

Results.—Detailed presentation of results here is unnecessary. They may be summarized as follows:

(a) **General:** Results were in general wildly inconsistent. With respect to *Bact. typhosum* they varied between an absence of inhibition with an effective inoculum of 1 to 10 organisms, and gross inhibition, when an inoculum of 2,500 to 1,000,000 was necessary to produce a positive culture. Some inhibition of the coliform species was always observed. Effective inocula varied from $260-700 \times 10^6$.

(b) **Selective Action:** This was in general moderately satisfactory. *Bact. typhosum* was recovered in two experiments when the typhoid/coli ratio was 1:4 approx. Inhibition of *Bact. typhosum* in both was relatively slight and growth occurred from an inoculum containing 35 to 350 organisms of that species. *Bact. typhosum* was also recovered in one of two experiments in which the typhoid/coli ratio was 1:70. In this instance, however, the medium exerted a very high degree of inhibition on the typhosum strain. An inoculum of the order of one million was needed for its isolation.

In neither of the two experiments where a large constant dose of coliform organisms was mixed with a falling series of dilutions of a suspension of *Bact. typhosum* was the latter isolated. In these tests gross coliform excess was

ensured where the inoculum of the pathogen was small. This prevented successful typhoid isolation since coliform overgrowth persisted in all subcultures from the selenite series.

(c) *Inconsistent Results*: These were manifold. The following examples are illustrative:

(i) *Different Results with the Same Media*.—B.B.L. medium full strength in one experiment showed no survivors from 700 *Bact. typhosum* (Z. H. H.), in another survival and growth from 30 organisms occurred.

Filtered B.B.L. medium full strength required an inoculum of the order of 700 to 7,000 *Bact. typhosum* (Ty2) for growth in one experiment. In another an inoculum of 2 organisms (approx.) was effective.

(ii) *Inconsistent Effects of Dilution of the Medium*.—In one pair of experiments R.A.M. College medium at half strength was much more inhibitory for both *Bach. typhosum* and the coli strain than the full strength medium.

In another pair of experiments a dilution of 1:4 produced no reduction of a high inhibitory effect on *Bact. typhosum* in pure culture, though immediate lethal action was reduced. The effect of this dilute medium on the coliform strain in pure culture however was a great deal less than that of the medium at full strength. In the mixed culture experiments with these dilutions 1:4 was slightly more selectively effective since typhoid suppression was now reduced but coliform suppression was not.

In other experiments dilution to 1:4 with *urine* rendered a medium much more inhibitory to *Bact. typhosum* than did dilution to 1:2. If *saline* was used to bring the final dilution to 1:4 all inhibitory effect on *Bact. typhosum* disappeared. Approximately the same loss of inhibition occurred when peptone water was the extra diluent: When a dilution of 1:4 was produced by the addition of distilled water the medium was similar to, or slightly greater in inhibitory effect on *Bact. typhosum* than, the 1:2 dilution.

(iii) *Inconsistency between Degree of Lethal Effect on an Inoculum After Six Hours, and the Minimal Effective Inoculum Needed to Give Evidence of Growth in Twenty-four Hours*.—In general when the culture population was stationary or increased in six hours there was no gross evidence of a lethal effect in the twenty-four hour cultures. When the six-hour culture showed a reduction, however, this bore little apparent relationship to the final lethal effect as shown by the twenty-four hour subcultures.

For example: Two cultures with a six-hour population reduction to approximately 1:50 showed final ineffective inocula (i.e. inocula in media showing no survivors after twenty-four hours) of 25 and 2,500 respectively.

Conversely in two instances when ineffective inocula as finally demonstrated were 700, population reduction after six hours was to 1:4 and 1:250 respectively. (In this instance the media were the same but dilution was 1:4 and 1:1 respectively, hence the result may indicate more rapid action on the susceptible

members of the population, but no increase in the number of these, as the concentration of the medium is raised.)

(iv) *Inconsistent Results in Mixed Cultures*.—In the four experiments in which *Bact. typhosum* and the coliform strain were inoculated into the medium in a constant ratio, comparison with pure cultures of these species in the same media showed that in one experiment coliform inhibition was much less in the mixed culture; in another *Bact. typhosum* inhibition was much reduced while coliform inhibition was greatly increased; in a third coliform inhibition was again reduced; while in the fourth there was an increase (less in the case of *Bact. typhosum*) of inhibitory effect on both species.

DISCUSSION

It is suggested that variation of sensitivity at different stages in the growth cycle, the presence of resistant mutants in varying proportions, or a combination of both these factors might account for the otherwise inexplicable inconsistencies detailed above.

With regard to the former, reduced sensitivity to harmful agents during the lag phase is well known. Multiplication of survivors, however, has occurred in these experiments. This indicates the passage of such into the susceptible logarithmic phase. If growth-phase variation is the true explanation of our findings, therefore, it would almost seem that here the general rule is reversed and it is the lag phase which must be susceptible.

The hypothesis of the sole survival of resistant mutants calls for an explanation of the extreme variation in different specimens of urine from the same person of the proportion of such mutants. In this connexion two observations may be noted.

(a) Z. H. H. does pass a small-colony mutant in his urine, the characteristics of which will form the subject of a later communication, but there is no evidence that this mutant was the cause of the findings recorded with selenite media.

(b) Growth of subcultures on agar from full strength selenite was sub-optimal, a partially inhibitory concentration of selenite being apparently carried over in the inoculum, but scanty larger colonies were noted among the majority of small ones. On this medium colonies assumed a slightly brown colour which deepened to brick red.

When subcultures from selenite of similar strength was made to MacConkey plates only a few colonies were red, the majority were colourless. There was, however, no apparent difference in sensitivity to selenite of organisms forming red and colourless colonies. Inocula from two colonies of each type survived overnight incubation in double strength selenite. Only one of the original red-colony cultures now produced red centred colonies on MacConkey's plate subcultures. The other, and the two original colourless-colony cultures produced colourless colonies.

As has been already shown the removal of the similar red deposit from

the medium by Seitz filtration produced variable, and not always favourable, results.

B.—TETRATHIONATE BROTH

Media: Tetrathionate broth was locally made to the formulæ of Rolfe (1946) and Hynes (1942).

Organisms: (1) A coliform strain; (2) *Bact. typhosum* (Z. H. H.).

METHODS

These were similar to those used for the work on selenite except that the volume of medium (which was used in universal containers) was 5 ml., and inocula were 1.0, 5.0, or 10.0 ml. so that medium dilution was 5:6, 1:2, or 1:3.

Results are summarized in Table I.

Observations on Experiments Tabulated in Table I.—The best selective result obtained in any of these experiments on enrichment media was that following the use of "Rolfe B" medium in Series 1. Unfortunately "Rolfe B" in Series 3 was highly inhibitory, while the very narrow margin between a highly selective and a general inhibitory effect was demonstrated by the difference between the *same batches* of "Rolfe B" at 1:2 and 5:6 (Series 1 and 2) and 1:2 and 1:3 (Series 4).

It may be noted that Rolfe himself recommends that both his A and B media should be used concurrently and that each batch of media should be controlled by testing with known inocula before use.

DISCUSSION

(1) Both selenite and tetrathionate under suitable conditions gave excellent results on the suppression of excess coliform organisms and the isolation of a minority of *Bact. typhosum* from urine.

The former failed when coli were in gross excess, but such excess may be considered extremely unlikely in urine, since even in fæces of fæcal carriers of *Bact. paratyphosum* B the pathogen may be in excess and pathogen/coli ratios of 1:100 and 1:1,000 are "not uncommon" (Holt and Wright, 1942).

(2) On the other hand media were found very variable in effect, the selenite grossly and unaccountably so. In our hands tetrathionate gave the best results of any obtained but Moore (1950) working with *Bact. typhosum* in sewage found selenite to be superior to tetrathionate (the latter being not worth using). He also noted that even selenite was actually *inferior* to direct plating in 2 or 3 experiments. Direct plating should thus never be omitted.

(3) It is therefore suggested that, since (a) excessive overgrowth with coliform organisms in urine is not likely as long as specimens are kept in the cold from the time of passing until cultured; (b) overgrowth of other species may be eliminated by direct plating on suitable media (which owing to relative unreliability of fluid enrichment should be used in any case), fluid enrichment has little or no place in the examination of urine for organisms of the enteric group.

TABLE I.—INHIBITORY AND SELECTIVE ACTION OF TETRATHIONATE BROTH

Series	Medium	Dilution	Effect on Bact. typhosum		Effect on coliform organisms		Effect on typhosum and coli (Typhoid/Coli ratio = 9/2,000 in Series 1)	
			Effect on Bact. typhosum		Effect on coliform organisms		Effect on typhosum and coli (Typhoid/Coli ratio = 9/2,000 in Series 1)	
1	Rolfe A	1 : 2	No lethal effect apparent—but little multiplication in six hours. Multiplication from 4 or 5 organisms in twenty-four hours		Multiplication in six hours but no growth from 25 organisms in twenty-four hours (continuing lethal action)		Overgrowth of coli (due to slight actual growth and inoculum excess) in six hours. In twenty-four hours, typhoid multiplication with slight fall in viable coli made isolation of typhoid possible from cultures originally containing 20,000 coli (and 90 typhoid) or less, while a single typhoid organism could be detected	
	Rolfe B	1 : 2	No lethal effect. Multiplication (greater than in Rolfe A) from 1 or 2 organisms in twenty-four hours		Lethal effect (no growth from 10 organisms in six hours or from 10,000 in twenty-four hours) and no apparent multiplication of survivors		Typhoid could be isolated from a culture containing 20,000 coli in six hours or 2×10^6 coli in twenty-four hours while a single typhoid organism could again be detected	
	Hynes	1 : 2	Multiplication in six hours		Multiplication in six hours continuing with no inhibition later		Typhoid could not be isolated	
2	Rolfe A	5 : 6	No multiplication, slight lethal effect in six hours. Multiplication from 9 organisms in twenty-four hours					
	Rolfe B	5 : 6	Highly inhibitory. No positive subcultures from original culture containing 9,000 organisms in six or twenty-four hours					
	Hynes	5 : 6	Multiplication in six hours, multiplication from 9 organisms in twenty-four hours					
3	Rolfe B	1 : 2	3 tests failed. No positive subcultures obtained from 10,000, 1,700 and 7,000 typhoid organisms in original primary cultures inoculated to medium					
	Rolfe A	1 : 3	Confluent growth from 12-20 organisms inoculated					
	Rolfe B	1 : 2	No growth from 12-20 organisms in media as prepared or acidified					
4	Rolfe A	1 : 2	60-fold increase of 12-20 organisms					
	Rolfe A	1 : 3	Confluent growth from 12-20 organisms inoculated					
	Rolfe B	1 : 2	No growth from 12-20 organisms in media as prepared or acidified					
5	Rolfe A	1 : 3	Confluent growth from 12-20 organisms inoculated					
	Rolfe A	1 : 3	Confluent growth from 12-20 organisms inoculated					
	Rolfe B	1 : 2	No growth from 12-20 organisms in media as prepared or acidified					

Typhoid/coli ratio 1 : 30. Few typhoid from cultures containing 50, 5,000 and 50,000 (but not from 500 or 5). No coliforms from 15×10^6 in twenty-four hours

III

THE USE OF PRECIPITATION

The use of a colloidal precipitate produced by the addition of aluminium sulphate and chalk for the isolation of enteric organisms from water is described by Suckling (1943). In the method as described the treated sample is centrifuged at a high speed to pack the deposit. Rappaport and Rosenknopf (1948) used the calcium oxalate precipitate produced by the reaction between added sodium oxalate and calcium salts already present, to carry down organisms suspended in urine.

Viability of Bact. typhosum in Refrigerated Urine.—Unless specimens are centrifuged treatment must be relatively prolonged to allow for the deposition of the precipitate produced by such methods. If centrifuging on the scale needed were practicable the use of a precipitant might be omitted, since it is merely proposed as a practical substitute for large scale centrifuging. In general the tests to be described were carried out overnight. This calls for adequate cold storage facilities.

To determine whether such prolonged treatment was likely to be associated with a high death-rate of the pathogens present, and so to reduce the chances of their isolation, a plate viable count was made on a sample of Z. H. H. urine soon after it was passed and again after one week in the refrigerator. Within the limits of experimental error the counts were identical.

Present Investigation.—Both precipitation methods referred to above were tested in *Bact. typhosum* (Z. H. H. and Ty2) and *Bact. paratyphosum* A (I. S. A.).

A.—ALUM

Preliminary tests showed that (1) 1 per cent each of alum and chalk produced no rapid or great reduction in viability of *Bact. typhosum* in Z. H. H. urine, since 40 per cent survived two hours after the addition of this quantity of each of these substances to the urine. (2) The optimal quantity of alum and chalk to produce a good flocculent deposit appeared to be 0.1 per cent of each.

1st Experiment: 100 ml. amounts of urine containing 100 *Bact. typhosum* Z. H. H. were treated with alum/chalk in doses of

$\frac{0.01 \text{ gramme}}{0.01 \text{ gramme}}$, $\frac{0.1 \text{ gramme}}{0.01 \text{ gramme}}$ and $\frac{0.1 \text{ gramme}}{0.1 \text{ gramme}}$ respectively.

After twenty-four hours in graduated cylinders deposits measuring less than 0.5 c.c., 1.0 c.c. and 1.5 c.c. respectively were obtained. 95 ml. were aspirated off from each deposit which was then resuspended in the remaining fluid and cultured as follows:

Plates 0.5 and 1.0 ml. molten agar which was then poured as plates.
0.25 ml. spread on each of two plates.

Fluid 1.0 ml. to a tube of broth, 0.5 ml. and 0.25 ml. to each of two tubes of broth respectively, and 0.1 ml. to each of 5 tubes of broth.

Results.—Plates inoculated with the first (< 0.5 c.c.) deposit were negative. Fluid cultures gave an "absolute recovery" of 11 to 12 per cent of the *Bact. typhosum* present, and a probable recovery of over 15 per cent.

Plates inoculated with the second (1.0 c.c.) deposit indicated a 20 to 24 per cent recovery and broth gave an "absolute recovery" of 6 to 7 per cent.

The third (1.5 c.c.) deposit on plates showed an estimated 20 to 30 per cent recovery and broth an "absolute" 10 per cent recovery.

(N.B.—"Absolute recovery" was obtained by taking the number of positive fluid cultures and recording it as the number of organisms present in the sum of the volumes constituting their inocula. Since this assumes that each culture, whether from 1.0 or 0.1, was initiated by a single organism the results are minimal.)

B.—OXALATE

1st Experiment: Z. H. H. urine was diluted with sterile filtered urine to contain 150 *Bact. typhosum* per 100 ml. (approx.), 100 ml. of this diluted urine were treated with 10 to 11 ml. of 2 per cent neutral sterile solution of sodium oxalate. After standing overnight in the refrigerator, the supernatant urine was aspirated off, leaving 5 ml. in which the deposit was resuspended.

Culture.—0.25 ml. of this resuspended deposit was plated on each of two plates, while the following volumes were added to containers of broth: 1.0 ml., 2×0.5 ml., 2×0.25 ml., 5×0.1 ml., and 5×0.036 ml. (approx.).

Results.—**Plates:** 0.5 ml. plated yielded 8 colonies of presumptive *Bact. typhosum* indicating 80 in 5 ml., i.e. A recovery by precipitation of just over 50 per cent of the organisms originally present in the 100 ml. treated with oxalate.

Broth: Positive cultures occurred with inocula of 1.0 ml. and 0.5 ml. with 1 of 2 0.25 ml. inocula, and 3 of 5 of both 0.1 ml. and 0.036 ml. Thus the "absolute recovery" was 10 per cent and the lowest probable recovery 17 per cent (the "lowest probable" recovery was based on an unfavourable adaptation of McGrady's tables to the results obtained).

2nd Experiment: (a) Z. H. H. urine, and (b) filtered urine containing 1,000 *Bact. typhosum*, strain Ty2 per ml. (estimated by Brown's tubes), were both serially diluted in 18 ml. quantity in filtered urine. A viable count was carried out on each series, each tube treated with 2 ml. oxalate solution, and each series placed in the refrigerator. (c) A duplicate series of dilutions of Z. H. H. urine was similarly treated. In the first two series of tests supernatants were aspirated and complete deposits plated.

In the duplicate Z. H. H. series tetrathionate broth was added after the supernatants were removed to determine the efficiency of a combined precipitation and enrichment method should gross contamination on directly inoculated plates indicate a need for enrichment. These cultures were subcultured to plates after six and twenty-four hours.

Results.—(a) Z. H. H. urine 1st series. Plating of complete deposits from tubes originally containing an estimated 70 organisms and 7 organisms yielded

53 colonies and 3 colonies respectively, i.e. 40 to 70 per cent recovery; while a repeated plate viable count on the supernatant urine in a tube in this series indicated a removal of over 90 per cent of the organisms originally present (the count being only 6 per cent of the original).

(b) *Ty2 suspension in urine.* Plating indicated a 70 per cent recovery.

(c) *Z. H. H. urine 2nd series.* Positive subculture was obtained after twenty-four hours from the tetrathionate medium added to the precipitates in the tubes originally containing 6 or 7 organisms and 65 organisms (approx.). A repeat plate viable count on supernatant urine showed a removal of over 80 per cent (count 14 per cent of original). The irregular results of enrichment were again demonstrated by a failure of growth in the tetrathionate added to the deposit from the tube originally containing 650 organisms (approx.).

3rd Experiment: Oxalate treatment of 22.5 ml. volumes of serial dilutions of *Z. H. H. urine*, and mixtures of *Z. H. H. urine* and a suspension of coliform organisms yielded an approximate 35 per cent recovery of *Bact. typhosum*, but only a 4 per cent recovery of the coliform strain.

4th Experiment: Note: the earlier sample inocula from deposits which were used for fluid culture were, owing to the nature of the tests, too small for McGrady's table to be used in the assessment of the results obtained. The 4th experiment was therefore designed so that these tables could be used, while an attempt to remove deposits by using a separating funnel rather than removal of supernatants by aspiration was made. Cultures to which no precipitant had been added were also investigated.

Method: *Bact. paratyphosum A* (as passed in the urine of I. S. A.) was used. The urine was diluted to contain an estimated 300 organisms in 100 ml. Then 100 ml. amounts were placed in pairs of cylinders and separating funnels. To one cylinder and one funnel oxalate solution was added. The others were untreated.

After refrigeration overnight, the lower fractions were separated by running off from the funnels or aspiration of the bulk of the contents of the cylinders. These lower fractions were then made up to *their original volume* with sterile urine, and the organisms present in them and in the upper fractions were counted by the fluid method.

Owing to contamination, and inadequate identification of organisms present in the field cultures showing growth, these experiments failed but are mentioned since they suggested:

(i) a 30 to 60 per cent recovery from the oxalated urine in the cylinder test.

(ii) the possibility that the organisms present in the deposit obtained in oxalated urine might not be carried down by the calcium oxalate formed but might merely accompany precipitation at no greater rate than would occur in untreated urine by gravity.

5th Experiment: A further experiment was therefore devised (a) in a further attempt to assess the efficiency of precipitation by the fluid culture method of

counting; (b) to check results by quantitative plating; (c) to investigate the possibility suggested at (ii) under experiment 4 above.

Preliminary Considerations.—(i) *The Strain or Organisms for Use:* Most of the foregoing experiments were carried out with *Bact. typhosum* as passed in Z. H. H. urine. These organisms often exhibited a tendency to roughness, and this leads to a considerable increase in the rate at which the organisms deposit in fluid. The assessment of the role of an introduced precipitant in effecting concentration by deposit is thus made difficult. *Bact. typhosum* Ty2 was therefore chosen for use in further experiments.

(ii) The rate at which a relatively dense suspension produces a gravity deposit in twenty-four hours is, in any case, considerable, as is shown by the "button" or "blob" of organisms constituting the negative control in the preliminary reading of agglutination tests carried out by Felix technique. To counteract this factor in experiments designed to demonstrate carriage down by a precipitant it was decided to determine the elevation of the specific gravity necessary to prevent deposition by gravity.

Preliminary Observation.—A series of tubes of urine containing increasing amounts of saccharose in solution were therefore prepared and three drops of a suspension of *Bact. typhosum* Ty2 in urine were added to each. The lowest concentration of saccharose in which no visible deposit occurred in 48 hours was 30 per cent (having a specific gravity in this urine of 1.115).

Final Observation.—600 *Bact. typhosum* Ty2 (approx.) were therefore added to two 100 c.c. amounts of sterile filtered urine, and to two 100 c.c. amounts of sterile filtered urine containing 30 per cent saccharose (S.G. 1.115), in cylinders. One of each pair of cylinders was oxalated, the other left untreated.

Six drops of the concentrated deposits (or lower fractions) were inoculated on agar plates for a plate viable count. The remainder of such deposits or lower fractions was then made up to their original volume as in experiment 4. These four resuspensions and the four supernatants were then submitted to a fluid viable count.

Results.—Contamination of fluid cultures was again serious but the identity of organisms present in all essential instances was determined.

(i) *Oxalated urine (normal S.G.)*

Deposit (in 3 ml., i.e. 3 per cent volume):

Plate samples indicated 104 organisms present.

Fluid samples indicated probable 350 organisms present.

Supernatant samples indicated a probable 170 to 250 organisms present.

Recovery in precipitate: 17–58 per cent.

(ii) *Untreated urine (normal S.G.)*

Lower fraction ("deposit" = 4 ml., i.e. 4 per cent volume):

Plate samples indicate 108 organisms present.

Fluid samples indicate a probable 35 present.

Upper fraction indicate a probable 250 present.

Lower fraction content: 18–6 per cent.

(iii) *Oxalated urine containing 30 per cent saccharose (S.G. 1115).*

Deposit (in 3 ml., i.e. 3 per cent volume):

Plate samples indicate 114 organisms present.

Fluid samples indicate a probable 170 present.

Supernatant samples indicate a probable 1,600 * (350).

(* Sampling error: all five 1.0 ml. samples yielded growth of *Bact. typhosum*. If only 4 of these had been positive the probable number indicated would be 350.)

Recovery in precipitate: 19-28 per cent.

(iv) *Untreated urine containing 30 per cent saccharose (S.G. 1115).*

Lower fraction ("deposit" = 4 ml., i.e. 4 per cent volume):

Plate samples indicate 23 organisms present.

Fluid samples indicate a probable 20 organisms present.

Upper fraction indicate a probable 600 organisms present.

Lower fraction content: 4.33 per cent (i.e. proportional to the volume of fraction. No evidence of gravity deposit).

DISCUSSION

It appeared therefore that precipitation by means of treatment with oxalate affords a useful means of concentrating enteric group organisms present in urine for subsequent plate culture, and that a trial of the method in routine work was indicated. For such a trial it was considered that two ounce flat bottles would be convenient containers in which to treat specimens. Since it seemed desirable to limit the area on which the deposit accumulated, so that removal of the supernatant without disturbance of the precipitate could be maximal, a rack was devised in which the bottles could be stacked inclined at an angle and resting on one of their narrower bottom edges, so that deposition of the precipitate occurred along this edge.

IV

PRIMARY INCUBATION IN BILE-SALT FLUID

MEDIA OR PRIMARY INCUBATION OF URINE AT 37° C.

Poor results on examination of specimens in which obvious multiplication of organisms had occurred owing to delay and lack of cold storage seem at first to condemn the use of simple media or incubation of the urine sample itself. Such adverse treatment, however, might selectively favour the growth of saprophytes with an optional temperature below 37° C. At 37° C. pathogens would not suffer this relative disadvantage. It also seemed possible that the use of MacConkey's fluid medium and of its Mannite modification for primary culture might constitute a good screening method. If Mannite were not fermented this would indicate an absence of enteric group organisms and the specimen could be discarded. If Mannite were fermented but lactose were not, a relatively pure culture might be indicated and the absence or presence of gas in the Mannite medium constitute an early guide to the species of pathogen present.

It was appreciated that urea-splitting organisms might by the alkali produced in the urine inoculum, obscure the presence of *Bact. typhosum* in the Mannite medium. This led to an acceptance of the need to subculture all specimens where a definite alkaline reaction was noted in either or both media. The possible presence of paratyphoid species would in any case be suggested, even in the presence of an alkaline reaction, by gas production.

The following investigations were carried out.

A. FLUID MEDIA

(1) Technique

(a) *The primary media* used were fluid MacConkey and a similar medium in which Mannite took the place of lactose.

(b) *Subcultures* were made to agar, D.C.A. and Wilson and Blair plates.

(c) *The inocula used were:*

(i) Z. H. H. urine

(*Bact. typhosum*)

(ii) A. W. M. Y. urine

(*Bact. paratyphosum* A)

Serially diluted in pooled unfiltered urine which had been, (i) previously refrigerated, (ii) left at room temperature overnight.

(iii) Z. H. H. urine mixed with a suspension of coliform organisms to give approximate coli/typhosum ratios of 10:1 and 100:1 respectively serially diluted in pooled unfiltered refrigerated urine. The following dilutions were employed: Z. H. H. urine diluted to 10^{-8} and tested undiluted and at 10^{-4} to 10^{-8} dilution (since past experience indicated a probable expectation of $\pm 10^7$ organisms per ml. in this urine).

A. W. M. Y. urine diluted to 10^{-6} and tested undiluted and at 10^{-2} to 10^{-6} dilution (expected para A content of specimen being of the order of 5×10^4 organisms per ml.).

In the mixed test coli dilutions were added to Z. H. H. urine dilutions, in proportions suggested by an expectation of 10^7 *Bact. typhosum* in the latter per ml., to give approximately 10:1 and 100:1 coli typhosum ratios. The former series were tested undiluted and at 10^{-6} and 10^{-7} dilution, the latter only at 10^{-7} and 10^{-8} (the latter tests proved to be of little value owing probably to over dilution).

(d) *Control:* The urine exposed to room temperature was cultured before being used in the test to estimate the organisms being introduced by its use as a diluent.

(e) *Method:* The fluid media were used in 5 ml. quantities in "universal containers." The inoculum consisting of an equal (or occasionally 4/5) volume of the urine dilutions mentioned above. Subcultures were carried out on such of the subculture media listed as appeared indicated by the effects produced on the fermentable substances in the primary media.

(2) Results

- (a) *Control Culture of Urine Used as Diluent*: The urine kept at room temperature gave a heavy growth of large gram + cocci when one drop was inoculated on a plate. Lactose-fermenting species were not present.

NOTE:—It became apparent in the ensuing test, however, that lactose fermenting organisms *were* present in the refrigerated pooled urine, hence the use of this diluent rather than that kept at room temperature for the mixed coli/typhosum test was, though apparently the more desirable, unfortunate.

- (b) *Isolation of Pathogens*: The result obtained with critical inocula and different diluents are recorded in Table II.

B. INCUBATED URINE

The residue of the urine dilutions prepared and used as inocula for the fluid media was incubated for twenty-four hours at 37° C. It was then inoculated on solid media. The volume of the residue available for incubation was generally about 3.5 ml.

The results of subculture are given in Table III.

C. DISCUSSION

(1) In the presence of Lactose fermenting contaminants isolation may be made from original inocula of 2–10 *Bact. typhosum*, and ± 25 *Bact. paratyphosum* "A" in 5 ml. (i.e. possibly less than 1–2 *Bact. typhosum*, or ± 5 *Bact. para* A per ml. in the specimens examined) by the primary use of fluid bile salt lactose and Mannite media followed by subculture to D.C.A. and Wilson and Blair plates. In the presence of excess coliform organisms numbers of *Bact. typhosum* in the inoculum which are below 10–50 (2–10 per ml.) may be missed. The use of both D.C.A. and Wilson and Blair plates for subculture seems indicated.

(2) Fairly heavy contamination with gram + cocci did not, in the absence of lactose fermenting contaminants, prevent the isolation of *Bact. typhosum* when a single organism was introduced into primary cultures, while the similar inoculation of ± 3 *Bact. paratyphosum* A was also successful. Wilson and Blair's medium was not used in these circumstances and D.C.A. was not necessary, isolation being possible from subcultures on nutrient agar.

(3) In general it seemed that subculture from the Mannite medium is likely to be more successful than from the lactose medium.

(4) The incubation of the infected urine alone in the presence of lactose-fermenting contaminants was followed by isolation of *Bact. typhosum* when 100–700 were originally present (though the next higher 10-fold dilutions were not tested only one colony of *Bact. typhosum* was found on plating on both D.C.A. and Wilson and Blair media at this dilution). In a similar test *Bact. para* A—one colony on D.C.A. (but more on Wilson and Blair)—was isolated from an original inoculum of ± 15 pathogens.

(5) In the absence of lactose-fermenting contaminants (but this of course cannot be assumed in routine work) incubation of urine containing gram +

TABLE II.—ISOLATION OF ENTERIC GROUP ORGANISMS IN URINE BY THE USE OF FLUID BILE-SALT MEDIA

Expt.	Inoculum	Diluent	Dilution of inoculum	Probable pathogens +	MacConkey Lactose Mannite	Subculture (isolation of pathogen) (2)			
						Agar from L	D.C.A. from L	W & B from M	M
A.1	Z. H. H.	Nil Refrig. urine	1:1 1:10 ⁷	2 × 10 ⁷ —10 ⁸ 2-10	A AG AG		T+ (few) T+ (1 colony)	T+	
B.1	Z. H. H.	Nil R.T. urine	1:10 ⁸ 1:1 1:10 ⁷	?1 2 × 10 ⁷ —10 ⁸ 2-10	AG A (1) A A		T+ T+ T+ T+ few T+ few		
A.2	A. W. M. Y.	Nil Refrig. urine	1:1 1:10 ³ 1:10 ⁴	+25 × 10 ⁸ ±250 ±25	G (1) AG AG AG		T+ T+ T+ T+ conf. A+	T+ conf. A+	
B.2	A. W. M. Y.	Nil R.T. urine	1:10 ⁵ 1:1 1:10 ⁴	±3 ±25 × 10 ⁴ ±25	AG AG (1) AG			A+ conf. A+ conf. A+	A+ late —
A.3 a	Z. H. H. + coli 1/10	Nil Refrig. urine	1:10 ⁶ 1:1 1:10 ⁶	?1 1-5 × 10 ⁷ 10-50	— AG AG				
A.3 b	Z. H. H. + coli 1/100	Refrig. urine	1:10 ⁷ 1:10 ⁷ 1:10 ⁸	1-5 1-5 ?1	AG AG AG		T+ T+ 3 colonies	T+ T+ T+	T+

NOTES.—(1) Since lactose was affected by organisms in both urines *undiluted* neither was a pure culture of *Bact. typhosum* or *Bact. paratyphosum* A respectively.

(2) (i) No entry in a space indicates that the medium concerned was not used, or that its use afforded no information of value.

(ii) "—" means no pathogen isolated.

(iii) "A" = *Bact. paratyphosum* A isolated. "T" = *Bact. typhosum* isolated. "conf." indicates a confluent growth.

TABLE III.—THE USE OF URINE ITSELF AS THE PRIMARY MEDIUM

Expt.	Inoculum	Diluent	Primary Dilution	Probable pathogens		Medium (Isolation of Pathogens)		
				originally +	Agar	D.C.A.	W & B	
A.4	Z. H. H. urine	Nil	1 : 1	1-7 × 10 ⁷		T +	T + conf.	
		Refrig. urine	1 : 10 ⁵	100-700		T 1 colony	T 1 colony	
			1 : 10 ⁸	?1		—	—	
B.3	Z. H. H. urine	Nil	1 : 1	1-7 × 10 ⁷	T +	T + confluent		
		R.T. urine	1 : 10 ⁷	1-7	Contaminated	T +		
			1 : 10 ⁸	?1	Contaminated	T + confluent		
A.5	A. W. M. Y.	Nil	1 : 1	± 15 × 10 ⁴		A +	—	
	urine	Refrig. urine	1 : 10 ⁴	± 15		A 1 colony	A +	
			1 : 10 ⁵	± 2		—	—	
B.4	A. W. M. Y.	Nil	1 :	± 15 × 10 ⁴	Contaminated	A +		
	urine	R.T. urine	1 : 10 ⁴	± 15	Contaminated	A +		
			1 : 10 ⁵	± 2	Contaminated	Sterile		

cocci was followed by the isolation of *Bact. typhosum* on D.C.A. when one organism, and of *Bact. para* A when ± 15 organisms were initially present in the urine before incubation. Nutrient agar was *not* a suitable medium for subculture in these circumstances.

(6) Since, whatever the reaction in the lactose medium, fermentation of Mannite indicates the need for plate subcultures, since as indicated above subculture from Mannite appears to yield the better growth of pathogens from a mixed culture, and since there is probably little advantage in not using a selective medium for any subcultures necessary, it is probable that in practice the method might be confined to the use of the Mannite fluid medium only.

V

SUMMARY AND CONCLUSIONS

(1) Four methods for the concentration of scanty pathogens of the Enteric Group in urine have been quantitatively investigated and the following conclusions reached:

(a) *Filtration*.—The use of filter pads upon which the organisms are trapped in the process of filtration, as an inoculum, though probably admirable for the examination of infected water when a very large volume of a single specimen can thus be sampled, is not the method of choice for the examination of urine specimens in large numbers from a community with a high carrier rate since—

(i) It makes too great demands on time and material to be practicable for single specimens.

(ii) A high carrier incidence renders it necessary to re-sample too many of the individual specimens in a pool for the method to be of value in reducing work (Walton) unless it is applied merely to the presumptive negatives after a primary direct plating test.

(b) *Enrichment*.—This method, though it may yield excellent results, is too uncertain to replace direct culture to which it may at times be inferior. while there is little evidence to suggest a degree of coliform admixture in positive specimens necessitating the high selective action obtained by good enrichment.

(c) *Precipitation* (oxalate).—This method is simple and affords a high degree of concentration.

It has the advantage that—

(i) the precipitant may be added to a bulk specimen after this has been sampled to direct plates—the precipitate being cultured only when direct plating is negative.

(ii) it may be combined with enrichment, the need for the latter being assessed on the evidence of contamination afforded by such direct plates. Viability of pathogens present is not adversely affected by the oxalate nor by the necessary cold storage while the precipitate is formed and deposited.

(d) *Simple Primary Fluid Culture*.—This method, using fluid MacConkey

media, containing lactose and Mannite respectively as indicator fermentable carbohydrates, seems of value. It is probable that the Mannite medium only is needed if subsequent plating is on selective media. The presence or absence of gas may be of value as a preliminary guide to the species of pathogen present.

(2) It was therefore decided that a trial should be made of both the precipitation and primary fluid culture methods in parallel, that direct plating should also be used, and that, by the results of such a trial, the need for concentration, and the better method of concentration if this prove necessary, should be assessed.

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NOTES ON TREATMENT OF TROPICAL DISEASES

BY

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FILARIASIS

(1) THE Nematodes which inhabit the tissues of human beings, including the filarial worms, the guinea-worm, and *Trichinella spiralis*, have, until recently, resisted all forms of treatment. Rogers and Leiper independently showed that large *intravenous* doses of sodium antimony tartrate reduced the number of microfilariae present in the peripheral blood, but that the effect was transient. O'Connor succeeded in controlling adult filarial worms by injections of sulpharsphenamine. Apart from surgical treatment sulphonamides and penicillin have assisted in modifying filarial lymphangitis, presumably by their action on secondary streptococcal infections.

(2) In experiments on animals infected with filariae Culbertson and Rose, having demonstrated the beneficial effects of injections of pentavalent antimonials, applied similar therapeutic experiments in human patients in Porto Rico, but with mixed results. In 1947, Welch and other U.S.A. observers noted that a non-metallic drug, di-ethyl-carbamyl-methyl piperazine, was effective in controlling filariae of cotton-rats. This drug called "hetrazan" in U.S.A., or "banocide," was subsequently tried against various infections of human patients with filariae. Hawking has suggested that banocide has no direct lethal action on microfilariae *in vitro*, but acts as an opsonin and encourages phagocytosis of the microfilariae by the reticulo-endothelial system.

(3) Santiago-Stevenson in 1947 in Porto Rico used the drug on 26 cases of *Wucheria bancrofti* infection, and demonstrated rapid reduction in the numbers of microfilariae in the peripheral blood, and the control of the symptoms of the disease. Subsequent similar therapeutic trials have been equally successful. The average dosage used was up to 2.0 mg./kg. body-weight t.d.s. for up to twenty-one days. The drug exhibits similar efficiency in the treatment of infections with *Loa loa*, in groups of patients treated by Stefanopoulo and Scheider (1948) and Murgatroyd and Woodruff (1949), in the same dosage as above. The microfilariae of *Loa loa* rapidly disappear from the blood and the patients cease to exhibit symptoms of loiasis, nor have any signs of reinfection appeared during a subsequent period of up to fourteen

months. Murgatroyd reports that serial complement-fixation tests show the disappearance of circulating filarial antibodies from the blood of patients within a few months of the commencement of treatment.

(4) Toxic effects, which are not serious, are chiefly of an allergic nature, following the liberation of filarial antigen from killed parasites; they include headache, nausea, rashes and increased eosinophilia. Antihistamine drugs rapidly overcome the toxic effects.

(5) Banocide has not been found as effective in the treatment of patients infected with *Onchocerca volvulus*. The initiation of treatment may reduce the number of microfilariae present in the skin, but the rapid onset of rashes, and œdema of the skin, with fever, marked pruritus, and lymphadenopathy often require the drug to be discontinued.

SCHISTOSOMIASIS

(1) Prior to World War I schistosomiasis had always been regarded as an incurable disease, but in 1917 Christopherson in Africa showed the value of intravenous injections of sodium antimony tartrate in the early stages of infections with either *S. hæmatobium*, or *S. mansoni*. He attributed the improvement in patients to the direct action of the antimony on the schistosome eggs. Fairley has suggested that antimony acts chiefly on the reproductive system of the adult female schistosome, and thus indirectly on the eggs. Recent experiments using radio-active antimony have shown that antimony is more rapidly excreted from the human body than had previously been estimated.

Emetine injections have also shown to be toxic to schistosomes.

(2) In 1946 Alves and Blair recommended the short intensive course of antimony given over a period of two days; but this technique has been criticized as being too dangerous.

(3) Lithium antimony thiomalate, stibophen, and fouadin, are other tri-valent antimonial compounds given intramuscularly to control cases of schistosomiasis with varying results; but on the whole not as satisfactory as the older methods of intravenous injection of tartar emetic.

(4) In Germany between 1939 and 1945 a new series of compounds known as the miracils were synthesized by German research workers. Therapeutic trials have suggested that the most efficient member of the series is miracil-D or nilodin. The latter is an orange-coloured powder, soluble in water and rapidly absorbable by the human intestine, especially if given in an uncoated preparation. This is the first drug exhibiting activity against schistosomes which can be given by mouth. It appears to act against the reproductive organs of the adult female schistosomes and interferes with the production of the schistosome ova. Later the adult worms themselves die after the drug has been given for about two weeks. Toxic effects noted have included nausea, vomiting, colic, sleeplessness, restlessness and disorientation. Examples of personal idiosyncrasy have also been encountered. At present the dosage is 75 mg. per kilo of body-weight spread over six days, and subdivided into twice

daily doses. Renal impairment or renal insufficiency are contra-indications. The drug exhibits its most marked effects against *S. hæmatobium*, less against *S. mansoni* and least against *S. japonicum*.

LEPROSY

(1) Through several centuries, oils of the genus of *hydnocarpus* have been used in treating patients with leprosy; originally given by mouth or inunction, but later given by intramuscular, intravenous, or subcutaneous routes; and finally during the last few years by intradermal infiltration into the actual lesions. Chaulmoogra preparations studied for many years by Rogers have only slight bacteriolytic properties and more probably act by stimulating a tissue response.

(2) During the last ten years the increasing use of sulphones has materially assisted the recovery of cases of leprosy. In 1908 Fronun and Wittman synthesized di-amino-diphenyl-sulphone, and in 1939 Rist reported that this sulphone *in vitro* inhibited the growth of human tubercle bacilli.

Leprosy and tuberculosis have many points of resemblance, both are caused by acid-fast bacilli during childhood or adolescence through family or other close contacts; both diseases exhibit chronicity and poor response for treatment.

In 1943 Faget used intravenous injections of a sulphone promin in cases of leprosy with encouraging results. Other sulphones were tried against leprosy, diasone and sulphetrone, the latter being the least toxic, and being given by mouth. In 1949 Cochrane [1] suggested that the parent basic compound underlying the above-named sulphones might be equally beneficial. Accordingly di-amino-diphenyl-sulphone has been given by mouth, with very striking results. Dosage by mouth recommended is 100 mg. daily for two weeks, then 200 mg. daily for another two weeks, and finally 300 mg. daily as a maintenance dose. Striking reductions in clinical signs and symptoms are noted within a few months, but several months elapse before bacterioscopy becomes negative, and treatment must be maintained for years. The toxic effects include anæmia, dermatitis and the occurrence of "lepra" reactions. The sulphones have a direct anti-bacterial action, and cause rapid disintegration of leprosy bacilli.

(3) The German drug "thiosemicarbazone" has been used experimentally in conjunction with streptomycin in treating human cases of tuberculosis. In view of the analogies described above between leprosy and tuberculosis, the drug is being tried out by Ryrie on cases of leprosy in doses of 25-150 mg. daily. The results are promising, but as yet not of any statistical significance. Toxic effects; anæmia, granulopenia, jaundice, etc., may be severe and may preclude prolonged administration.

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At Random

TRAINING

"WASTING my time, I call it! I ought to be in my father's business learning the job and here I am for a couple of years 'square bashing' and learning nothing."

So spoke a rather smart-looking, well-turned-out young National Service soldier at the Depot when asked outside the mess-room how he was getting on and what he thought of National Service.

It is as well to state that this incident was in the earlier days of National Service. More recent articles and letters in the *Journal* have indicated that the average N.S. man, certainly towards the end of his service, did not consider that he was merely wasting his time, "Training at the Depot."

But was this particular N.S. soldier in actual fact wasting his time in the training which he was receiving at the Depot? He may have been missing learning the details of his father's business for a period; but he appeared smart, well turned out and obviously self-confident. Apart from any military or medical training which he may have been receiving, his general training, the contacts he had been making and the general life of the Depot quite obviously appeared to have benefited him; he was obviously being trained as a *Man* as well as a National Service Soldier.

In the Services there are many types of training and the difficulty at many stages of the individual officer's or soldier's service is to find time to fit in all the training which the "Training" experts and authorities consider should be covered. Some unfortunates appear to suffer from a complete plethora of training and to become permanently allotted to one of those groups whose function appears to be continuous attendance on one training course after another, merely because they are not settled in some particular or key job, not because they appear to be specially suitable for training in the particular subject for which the next course insatiably demands its quota of bodies.

Is that training wasted? It may well be in such cases, where the unsuitable individual attends course after course.

When discussing the subjects of *training* and of *knowledge* with a well-known personality of the Corps in the very early hours of the morning (he was in his time both notable for his mastery of languages, speaking and even thinking in some fifteen languages and half a dozen dialects, and notorious for early rising and for arrival at the Mess and at the hospital at impossibly early hours), he laid down the dictum that no knowledge, knowledge as such and therefore the training involved in that knowledge, is ever wasted. This

may of course have been in self-defence over his extreme interest and facility in languages as against his complete disregard for medical professional knowledge from the time he qualified and passed the Corps entrance examinations. His was a specialized knowledge acquired with special training and likewise the majority of the courses which constitute training in the Services are specialized courses.

Far be it from us to encroach on the prerogatives of the Director of Training and on the spheres of action of his numerous satellites and executive personnel who implement his directions on training. But in this note we would emphasize that there are many forms of training in the Services which are not covered by specialist courses and in which the actual training is not carried out by selected detailed specialist teachers. This training is in fact contained in the daily lives of all and in the day-to-day tasks which all either supervise or perform.

It is this form of training which appears to us to be just as important as, if not even more important than, the specialized trainings produced under the urgings of the Director of Training. It is the education of the junior by the senior in the M.I. Room, the Office, the Ward, in the Stores, Workshops and Laboratories, in the Mess and in the Field which is so important and which really builds up each individual as the capable, many-sided all-rounder, the versatile officer or soldier who in emergency is so valuable in the Service. Have your specialists, by all means, in fact as many specialists as time and opportunity can create and use as many as a reluctant finance department will allow; but, yet more important, have your versatile, competent all rounder often briefly called by his more specialized brethren—the G.D.O. The versatile G.D.O. is oft-times a very much undisguised blessing.

This is the responsibility of all in the Service, not merely of the specialist teacher or Training Officer; every single individual at some time or other, if not all the time, has this responsibility, the training of himself, possibly of his seniors and certainly of his juniors.

Considerable interest has been focused recently on this matter of Specialist training and Specialism in contemporary journals and papers. The Headmaster of Eton when speaking at a recent meeting of the Royal Society of Medicine commented very strongly against the too-early specialism engendered by the gradual introduction of the 1st M.B. training and examination into the school-stage of education whereas it rightly belongs to the post-school University stage. He pointed out that a sound, liberal, all-round education is as important to the doctor as, if not more important than to any other member of the community.

This aspect has also been stressed in the recommendations of the Good-enough Committee in their report on Medical Schools in 1944.

So, too, in the Service this general, all-round education, the responsibility of all, is just as important in producing the versatile individual who is so valuable under the many varied circumstances and emergencies of Corps service: the jack-of-all-trades, capable of turning his hand and mind to any-

thing and yet, most probably, a master of one speciality. Training, whether it be general or specialized, is every bit as important as food, clothing and equipment. Mr. Churchill well realized this and drew attention, after his return from a momentous meeting near America, to the need for training to meet not only specialized circumstances but *any* variety of conditions which might occur.

The variety of training required can immediately be realized by the more senior on thinking for a few moments on the variety of duties which each may have been called upon to perform during his service—medical attendant to all and sundry, to all classes and descriptions of humanity in peace and war: Cantonment Magistrate; driver of an ambulance train; Commander of a P. of W. Camp in starvation conditions; embarkation M.O. to climb precarious jacob's ladders up precipitous troopship sides; leader of desert convoys; and so on, are the various circumstances he may have met.

To those not yet familiar with the variety of duties which may fall to the lot of any medical officer in war the following extracts may be illuminating: extracts taken at random from a Training Directive by the D.D.M.S. 10th Corps in North Africa in 1943.

“(b) The OBJECT of the Medical Services in war must always remain the same, i.e. the treatment of sick and wounded and their evacuation down the Lines of Communication of those cases requiring expert attention, in order to give the casualty every facility of returning to the line or earning a livelihood should discharge from the Service be necessary.”

“(d) R.M.O. The consequences of the above should be:

- (i) a definite drill for the systematic sweeping of the battlefield to locate and clear casualties;
- (ii) personal recce of the ground, combined with a study of a contoured map to enable the R.M.O. and Fd. Amb. Comdr. to make full use of his vehicle to bring back casualties to R.A.P. and A.D.S. A car post (2 cars) located between R.A.P. and A.D.S. is for consideration.”

“This link in the chain of evacuation has many strains and stresses to bear, and requires initiative and foresight on the part of the R.M.O. It is a wise M.O. who prepares to meet each succeeding and altering circumstances with a ‘plan.’ This depends for efficient performance on previous comprehensive *Training*.”

“(e) Fd. Ambs. The main duty of the Fd. Ambs. is to clear from the R.A.P., but in effect its BASIC duty is to collect and evacuate casualties from any location on its front.”

“(2) SPECIAL.

Consequent on above, A.D.S.M.S. are requested to give full consideration during the present quiescent period to SPECIAL TRAINING in respect of the following:

- (a) Moving across desert in desert formation.
- (b) Moving through difficult country and having to deploy.

- (c) Following up attack through minefields.
- (d) Village fighting and collection of casualties.
- (e) Preparation for forthcoming operations.
- (f) Training of Regimental S.B.s and Fd. Amb. S.B.s.
- (g) Training of tank crews in First Aid.
- (h) Signposting of medical units.
- (i) Map reading and M.T. Instruction.
- (k) Comfort of patients."

[NOTE.—In the above extract, section (b), Brigadier Crocker is of course only referring to the problem of dealing with casualties and does not include the first duty and objects of the Medical Services in War; viz. the Maintenance of the Health of the Troops. *Vide* F.S.R. on the subject.]

To summarize then this subject of Training. It is the day to day training of each individual during the performance of all normal duties which gives the all-round education so valuable to all concerned which we wish to emphasize here. A general *Training* which will ensure that the National Service or any other Soldier will not find or even consider that his period of service has been waste of time.

Correspondence

SIR,

Most psychiatrists would agree with the general trend of Major Mackay-Dick's article, "Views on the Use and Abuse of Psychiatry," in the August number of the Journal. A small number of psychiatrists have been too willing to give "expert evidence" in favour of individuals on trial, insufficiently based on generally accepted principles of personal responsibility and prognosis.

The great majority of specialists in psychological medicine deplore this and the Courts have certainly learnt to give this type of "expert evidence" the weight and credence which it deserves. This is salutary both from the point of view of justice being done and for the retention of an adequate professional standard in the speciality itself.

Major Mackay-Dick's criticism evidently applies to two stages of procedure: (1) the Trial itself and (2) the procedure under Section 2 (4) of the Criminal Lunatics Acts, 1884, by which, in recent times, medical commissions have subsequently found a prisoner insane when the Jury, at the time of trial, has found him sane. In his criticism of this second procedure, he is in the good company of the Lord Chief Justice, who testified strongly before the Royal Commission on Capital Punishment, against this power of reversing the finding of a jury by means of a private enquiry by two or more medical practitioners.

With regard to (1) the Trial itself, Major Mackay-Dick's submission that

"Psychiatrists should not behave as witnesses for the Defence or for the Prosecution," may well be questioned, in spite of the certain amount of irresponsible evidence and opinion, which has already been admitted.

If justice is to be done, there would appear to be no reason why an individual on trial should be deprived, in the province of psychological medicine, of having facts in his favour or in mitigation of his offence being put before the Court as effectively as possible, when this is permissible in the province of general medicine. In all fairness to psychiatrists, it may be added that the opinions expressed by medical witnesses called by the defence have not *always* been beyond criticism:

If we turn from civilian to Court-martial procedure, there is little to which Major Mackay-Dick can take exception.

Under A.C.I. 692/49, the Army psychiatrist is not called on to express his opinion either for the Defence or for the Prosecution. His report on the soldier for trial is for the information of the Convening Officer and the Commanding Officer *only*.

If, however, the report discloses that the accused may be unfit to plead or may not be responsible in law for his actions at the time of the alleged offence, the Convening Officer, after reference to the Director of Army Legal Services, may order trial, ensure that the accused is given the opportunity to apply for legal aid, and supply a copy of Parts B and C of the psychiatrist's report (which deal with unfitness to plead due to insanity and with criminal responsibility) to the accused's legal representative, or to the defending officer if legal aid has been refused.

At the same time the defence will be informed that the military psychiatrist who made the report *will be available as a witness for the defence*, should the defence desire to call him.

Further, the accused cannot demand to be examined by a military psychiatrist, although he may be examined by a civilian psychiatrist at his own expense. The decision whether he shall be examined by a military psychiatrist rests with his C.O. or the Convening Officer concerned, who are guided by the advice of the medical officer.

Except in the circumstances just mentioned, the psychiatrist's report is for the information of the C.O. or Convening Officer only. The Army psychiatrist *can* be called as a witness for the defence but only if the Convening Officer decides that his evidence is relevant to the issues to be tried. In this event the accused or his defending officer or legal representative is entitled to interview the psychiatrist and take a statement from him if he is willing to give one.

The defence can request that a subpoena be issued to a civilian psychiatrist who has examined the accused but his expenses will only be borne by the public if the convening officer or the Court is satisfied that his evidence is necessary and relevant.

When the accused is fit to plead and was sane at the time he committed the offence, the Convening officer may make Part D of the psychiatrist's report available to the defending officer or legal representative of the accused. This

contains evidence as to "Character" and the psychiatrist answers the following questions:

- (a) Was the accused suffering at the time of the offence from any illness which might have affected his behaviour?
- (b) Is punishment likely to diminish the chances that he will repeat this or similar offences?
- (c) Is punishment likely to increase or diminish his efficiency as a soldier?

With these very adequate precautions, it is possible that Major Mackay-Dick may be willing to waive his objection to psychiatrists "behaving as witnesses for the Defence," in Court-martial procedure.

Moreover the provision of Part D of the psychiatrist's report to the Defence satisfies Major Mackay-Dick's suggestion that "the report should be a statement of fact concerning the individual's psychogenic constitution," both from the point of view of the individual himself and the efficiency of the Service.

Further, Major Mackay-Dick also states that "on certain charges, psychiatrists' reports are frequently to the effect that the accused would benefit from institutional treatment. However true such a recommendation might be," he goes on, "is it any reason or excuse why an accused should not be punished for his crime when there are fellow 'sufferers' living within the law?" He also states that psychiatric reports should "not influence the course of justice in cases fit to plead." Here, too, the Army procedure should satisfy him, for the custom is that the psychiatrist's recommendations regarding ultimate disposal apply only after the prisoner has served any sentence awarded him. This is obviously necessary for the sake of the morale of the unit to which the prisoner belongs.

Finally Major Mackay-Dick states that psychiatrists "have been forced into the position of deciding responsibility instead of advising regarding an individual's responsibility as a law-abiding citizen."

Does, in fact, the psychiatrist do anything but *advise*, like any other medical witness, at whatever stage he may be called on for an opinion either in military or civil procedure?

I have the honour to be, Sir,

Your obedient Servant,

L. C. F. CHEVENS,

Lt.-Col. R.A.M.C.

Reader in Psychiatry.

Royal Army Medical College.

Matters of Interest

At Netley on Saturday, October 14, 29 General Hospital, under the command of Lieut.-Colonel Snow, R.A.M.C., was on parade before its departure for Japan, for inspection by the Director-General.

The General Hospital was drawn up in companies under the command of Major Mackay-Dick, R.A.M.C., and Major Watts, R.A.M.C., the Q.A.R.A.N.C. Nursing Officers under the command of Major Hinchley, Q.A.R.A.N.C. After the inspection the unit marched past, and were then addressed by the D.G. who expressed his good wishes for their far journey and a safe return.

THE London Hospital Old Students' Dinner was held at the Trocadero Restaurant on October 10, 1950, the Director-General being invited to attend.

AN Exercise on Civil Defence at Weymouth, which was held under the direction of Colonel F. Langmaid, O.B.E., A.D.M.S., 43 Wessex Division, was visited by the Director-General. The attendance of medical officers of 43 Division amounted to 80 per cent, and the O.C. and many officers of 19 (Southern) General Hospital, Bath, also attended. Other officers present were Major-General G. C. Tyndall, D.D.M.S., Southern Command, Brigadier Escritt, Inspector of Training, and Colonel Sandford.

Demonstrations were given by Lieut.-Colonel Crosse, of the Field Training School and Major Whitcher from the Combined Gas School.

THE D.G.A.M.S. attended the R.A.S.C. Officers' Club Annual Dinner at the Trocadero Restaurant on Friday, October 13, 1950.

H.R.H. The Princess Royal opened the Hostel for Tuberculous Ex-Servicemen at the Centre at Enham-Alamein on October 23, 1950. The Director-General was present. He also attended an At Home given by the Empire Medical Advisory Bureau for Overseas Medical Visitors at B.M.A. House on Monday, October 23, 1950.

ALEXANDER MEMORIAL PRIZE 1949

The Alexander Memorial Prize perpetuates the memory of Thomas Alexander, C.B., F.R.C.S., who joined the service in 1834 and was Director-General 1858-60. He was a member of Mr. Sidney Herbert's (later Lord Herbert of Lea) Commission which effected the foundation of the Army Medical School and many improvements in Military Hospitals and the pay and relative ranks of Army Medical Officers.

This prize is awarded annually to the Regular Medical Officer of the Royal Army Medical Corps on full pay, or Officer removed from the Corps but still on the Active List, who, by professional work of outstanding merit, has done most to promote the study and improvement of either Military Medicine, Military Surgery, Military Hygiene or Military Pathology.

For 1949 the prize, a silver gilt Medal and cheque for £70, was awarded to Colonel W. A. D. Drummond, *O.B.E.*, *F.R.C.S.*, late *R.A.M.C.*, for his work in connexion with malignant disease in the Army.

REGIMENTAL GUEST NIGHT, HEADQUARTER OFFICERS' MESS

A Regimental Guest Night was held in the Headquarter Officers' Mess on Thursday, October 26, 1950, to which the following guests were invited:

General Sir John Crocker, Adjutant-General.
 Lieut-General N. C. D. Brownjohn, *V.C.I.G.S.*
 Major-General J. A. Gascoigne, *G.O.C.* London District.
 Canon F. Lloyd Hughes, Chaplain General.
 Colonel E. M. B. Dyson, Commandant, *Q.A.R.A.N.C.* Depot.
 Lt-Col. E. M. E. Dawe, Principal Matron, *Q.A.* Military Hospital.
 Dr. H. L. Marriott.

The Orchestra of the Band of the Welsh Guards played during dinner.

The Director-General, in a short speech, welcomed the guests. He presented, on behalf of the Officers *R.A.M.C.*, a bronze statuette to the Headquarter Officers' Mess, *Q.A.R.A.N.C.*, and a silver cup to the Depot, *Q.A.R.A.N.C.*

The bronze statuette entitled "Bombed" is the work of Mr. Benjamin Clemens, who was a serjeant in the Royal Army Medical Corps in World War I. The statuette formed part of an *R.A.M.C.* collection assembled in 1919 by the Committee for the Medical History of the War. It is now inscribed: "Presented by the Officers, *R.A.M.C.*, to The Headquarter Mess, *Q.A.R.A.N.C.*, 1950."

The silver cup is a "Tennis Cup" presented to the *R.A.M.C.* Officers' Mess, Rawalpindi, in 1907 by a group of distinguished local Indian gentlemen. It is now inscribed: "Presented by the Officers, *R.A.M.C.*, to the Officers, *Q.A.R.A.N.C.*, 1950."

The Director-General then presented the Alexander Memorial Medal for 1949 to Colonel W. A. D. Drummond for his work in connexion with malignant disease in the Army.

SPECIAL QUALIFICATIONS

THE following list should be of interest to many in and retired from the Corps and a stimulus to ambitious or on-coming junior officers.

The list shows the high qualifications obtained since the end of World

War II by Specialists in the Corps. This does not include Officers who are at present under instruction on courses 47, 48 and 49.

M.R.C.P.	...	...	...	...	...	15
F.R.C.S.	...	...	...	...	...	12
D.P.H.	...	...	...	...	...	13
D.T.M.&H.	...	...	...	...	...	10
D.C.H.	...	...	...	...	...	4
C.P.H.	...	...	...	...	...	8
D.P.M.	...	...	...	...	...	5
D.L.O.	...	...	...	...	...	5
D.R.C.O.G.	...	...	...	...	...	8
M.Ch.(Orth.)	...	...	...	...	...	1
D.O.	...	...	...	...	...	1
D.O.M.S.	...	...	...	...	...	3
D.A.	...	...	...	...	...	3
D.Phys.M.	...	...	...	...	...	1
D.M.R.D.	...	...	...	...	...	3
D.C.P.	...	...	...	...	...	1

Total 93

In recent months the following Army Health Officers have obtained the Post-Graduate qualifications noted against their names.

Major F. J. Ingham. C.P.H. and D.P.H. (London).

Major M. M. Lewis. C.P.H. and D.P.H. (London), D.T.M.&H. (England).

Major H. L. Wolfe. C.P.H. (England).

COURSES ON MEDICAL ASPECTS OF ATOMIC WARFARE AT THE R.N. MEDICAL SCHOOL

COURSES of instruction on "Medical aspects of Atomic Warfare" at the Royal Naval Medical School, Alverstoke, Hants, originally started for Medical Officers of the Royal Navy, have been made available to Wardmaster Officers in the Royal Navy, to Medical Officers of the R.N.V.R. and to certain civilian members of the nursing profession.

These courses were initiated in October 1948. At first they were intended only for Naval Medical Officers but soon it was decided that Medical Officers of the R.A.M.C. and R.A.F. should attend. In January 1949 the doors were thrown open to civilian medical officers nominated by the Ministry of Health. The medical officers standard course lasts five and a half days and the subjects dealt with include Atomic Physics, Effects of Radiation in the Human Body, Monitoring and Defence Organisation, Treatment of Casualties. The lectures are supplemented by talkie films.

Early this year shorter courses, lasting three days for Nursing Officers of the three fighting Services, were initiated and these were also thrown open to members of civilian nursing profession nominated by the Ministry of Health.

In August the Admiralty decided that it was desirable that medical officers of the R.N.V.R. should be given an opportunity of attending similar courses

of instruction and these started in September. About the same time it was decided that Dental Officers of the R.N. and R.N.V.R., who, especially in war-time, play an important part in all medical defence organizations, should attend these short courses. And finally, it was decided that Wardmaster Officers should also attend.

There is a permanent staff of lecturers at the Royal Naval Medical School and, in addition, lectures are frequently given on special subjects by outside lecturers.

The staff at R.N.M.S. keep themselves up to date in their subjects by frequent visits to other teaching and research centres and by attendance at international conferences.

Historical Accounts

HISTORY OF THE ROYAL ARMY MEDICAL COLLEGE¹

THE formation of an army medical school was the result of a recommendation made by a Royal Commission, which was appointed in May 1857, for the purpose of inquiring into the "regulations affecting the sanitary condition of the army, the organization of military hospitals, and the treatment of the sick and wounded." This Commission was presided over by the Right Honourable Sidney Herbert, afterwards Lord Herbert of Lea, who was, in fact, the founder of the school, and in whose memory a prize was instituted to reward the best work done in the school during each session. The report of the Commission was presented to Parliament early in 1858.

As far back as 1798, Mr. John Bell, the eminent Edinburgh surgeon, who had been employed at Great Yarmouth to treat the sick and wounded after the naval battle of Camperdown, proposed the establishment of a "great school of military surgery." Later, in 1805, the famous army surgeon, Dr. Robert Jackson, in his work on the medical department of armies, advised the organization of an "army medical practical school," and laid down in detail the subjects which he considered ought to be taught in it. In 1806 a Chair of Military Surgery was founded in Edinburgh, and filled by Dr. Thomson, who wrote a book on the hospitals in Belgium after the Battle of Waterloo. He was succeeded in 1882 by Sir George Ballingal, the author of the well-known "Outlines of Military Surgery."

In 1846, Mr. Tuffnell, a retired army surgeon, began to lecture on military surgery in Dublin, and collected a museum of appliances for the transport and treatment of the wounded, which was transferred to Netley in 1863. Both the Edinburgh and Dublin Chairs of Military Surgery were endowed by the State. It had also been the custom to attach officers selected for the medical

¹This history has been published in The Calendar of the Royal Army Medical College 1950-51 and is reproduced by permission of the Commandant.

service of the army to the General Hospital at Fort Pitt, Chatham, for the purpose of clinical and general training in their future duties.

Meanwhile the medical officers of the army had been taking steps to provide means for improving their knowledge of the special requirements of military service. In 1810, on the initiative of Dr. (later Sir James) McGrigor, the Director-General, a collection of morbid specimens was commenced at Hilsea. In 1816 the collection was removed to York Hospital, Chelsea, where many additions were made to it. Later, the specimens were removed to the General Hospital at Fort Pitt, Chatham, where at the expense of the army medical officers the collection grew rapidly and a museum was established. In 1824 a fasciculus was printed, and in 1833 a "Catalogue of Preparations, etc., in Morbid, Natural and Comparative Anatomy contained in the Museum of the Army Medical Department, Fort Pitt, Chatham," was published, filling 267 octavo pages. The museum then contained 14,189 specimens, including a large collection of natural history exhibits, and also 334 works of art. In 1829 the natural history collection was separated from the anatomical specimens. In 1845 the pathological specimens alone amounted to 3,083, and in 1850 to 5,888.

Further, a library was instituted by officers of the department, which was annexed to the museum in 1882. To this library liberal donations of books were made by the medical officers, Sir James McGrigor presenting on one occasion 1,500 volumes. In 1852 a catalogue was published showing in its pages nearly 10,000 volumes.

By these efforts of the army medical officers, Fort Pitt became a valuable educational centre and well suited for the role it was to play later on. The aspirations of the Medical Service of that day are expressed in the following quotation from the preface (p. vi) of the above catalogue: "It is fondly hoped that the time may come when the Medical Department of the Army shall have an establishment of their own in the Metropolis, which will not only contain the Museums of Anatomy, of Natural History, and their Library, but afford means for officers from all parts of the world again meeting . . . and associating with others who have more recently entered the Service and thus afford the opportunity . . . to exchange opinions on professional questions.

Although the library and the museum were not originated by the State, the fact that the two professorial chairs had been endowed indicates that the need for special instruction in military surgery was recognized by the authorities; but the military medical problem as propounded by various distinguished Army medical officers, including Brocklesby, Donald Monro, J. Bell and R. Jackson, had not then been grasped. No time, however, was lost in following up the recommendations of the Royal Commission. Another Commission, presided over by Mr. Sidney Herbert, was appointed to organize the school. The subjects and the course of instruction were defined, and professors appointed and all necessary arrangements made.

Miss Florence Nightingale had clearly recognized that failures of medical arrangements in war were due to want of executive power in the Medical Depart-

ment, and it was largely due to her influence that the School owed its inception and the Medical Service its autonomy.

On March 31, 1860, the Secretary of State for War placed the School under the government of a Senate which was charged with the supervision of the technical training of candidates for medical commissions. The Senate was at first composed of :

- The Director-General of the Army Medical Department.
- The Principal Medical Officer, Chatham.
- The Professor of Military Surgery.
- The Professor of Hygiene, and
- The Professor of Pathology.

Later, when it was decided that candidates for commissions in the Indian Medical Service should join the School, the President of the Medical Board, India Office, became a member of the Senate.

The School was established at Fort Pitt, Chatham, where, as has been observed, special educational facilities existed. The Army Medical Officers' Library and the Museums had already been established there, and it was also the custom to use the General Hospital at Fort Pitt for the reception of soldiers invalided as the result of tropical disease. The hospital therefore contained ample material for instruction in tropical medicine.

The first competitive examination for entry into the Army Medical Department was held in August 1860, and the successful candidates, together with the candidates for the Indian Army, were sent to the new School, which was opened on October 2 of that year by the Right Honourable Sidney Herbert, Secretary of State for War, the opening address being given by Deputy Inspector-General T. Longmore, who had been appointed Professor of Military Surgery.

The other chairs had been filled by the appointment of :

- Assistant Surgeon (retired) E. A. Parkes, as Professor of Hygiene, and
- William Aitken, M.D., as Professor of Pathology.

The Chairs of Military Surgery at Edinburgh and Dublin were then abolished.

In addition to his other duties the Professor of Surgery gave instruction in medical organization; it thus became officially recognized that medical officers must be specially trained if efficient administration is to be maintained.

On March 15, 1861, Deputy Inspector-General W. C. Maclean, of the Indian Medical Service, was appointed Professor of Military Medicine, thus completing the number of Professorships. He also became a member of the Senate.

Five sessions of the Army Medical School were held at Fort Pitt.

In 1862 it was decided that the invaliding depot should be removed to the Royal Victoria Hospital, Netley, which had just been completed. In order to keep in touch with the material required for the teaching of medicine and surgery, the Army Medical School was also transferred to Netley. The professors protested against the transfer as they thought it was undesirable to locate

the School so far from London, the centre of medical education. That the protest was justified is shown by the removal of the School to London on the completion of the 84th Session.

The Royal Victoria Hospital had not been designed as a medical school, and it was necessary to convert some of the hospital accommodation into lecture rooms, laboratories, museums, etc.

Each course of instruction, both at Fort Pitt and at Netley, lasted five months, and concluded with an examination in the subjects taught there, viz. Hygiene, Pathology, Military Medicine and Surgery. Candidates who qualified in these subjects were gazetted as medical officers.

In October 1871, the candidates for the Medical Service of the Royal Navy were sent to Netley to go through the same course as the other probationers, and an additional professor was appointed to teach the specialities of naval hygiene. The Director-General of the Medical Department of the Royal Navy then became a member of the Senate. Naval candidates ceased to attend in 1881.

The Sixth Session of the Army Medical School was opened at Netley on April 15, 1863, and its curriculum was continued there until the removal of the School to London.

In 1902, as a result of the recommendations of a Special Committee, which sat in London in 1901, under the Rt. Hon. St. J. Brodrick (Lord Midleton), then the Secretary of State for War, the Army Medical School was removed to London, in order to keep in touch with the medical institutions of the Metropolis. Steps were taken to provide a building suitable for the purpose; and pending its construction, the courses of instruction for the Royal Army Medical Corps were carried out in laboratories leased from the Conjoint Board of the Royal Colleges of Physicians and Surgeons of London. These courses commenced in August 1902, the School at Netley having been closed at the end of the previous June on the termination of the summer session. During this period the officers resided in the Hotel Belgravia from September 1, 1902, to May 30, 1903, and in the St. Ermin's Hotel from May 31, 1903, to May 14, 1907.

In the early courses in London only hygiene, pathology and military medical administration were taught. The year following, military surgery, including skiagraphy, was added, and in August 1905 military medicine resumed its position in the curriculum.

At the close of the course in London the probationers for the Indian Medical Service proceeded to Netley for two months' instruction in military medicine and surgery. This practice was discontinued on May 31, 1905, when the School at Netley was finally closed.

In 1905, the Queen Alexandra Military Hospital at Millbank was used for clinical instruction, the building having been formally opened by His Majesty King Edward VII on May 18 of that year.

In 1903, in accordance with the scheme of reorganization, a post-graduate

course for captains to qualify for promotion to major was instituted. This course, as originated, occupied six months, was held twice annually.

In 1909 the course was expanded to nine months, and so enabled the captains to obtain a more detailed instruction than was possible in the shorter period originally assigned.

On completion of the new building for the Royal Army Medical College, the courses of instruction commenced therein on May 15, 1907.

On the removal of the school to London, and the formation of the Royal Army Medical College, a Commandant and Director of Studies was appointed. The Senate was abolished and a College Council, consisting of the Commandant and the Professors, instituted.

Colonel H. E. R. James, *C.B.*, was the first Commandant, and held office until February 3, 1908.

On the outbreak of the Great War (1914–18) the bi-annual Senior and Junior Courses for Regular Officers ceased, and in October 1914, Major-General Sir David Bruce, *K.C.B.*, *F.R.S.*, took over as Commandant from Colonel B. M. Skinner, *C.B.*, *M.V.O.*, and remained in the appointment throughout the war.

College activities soon centred principally upon the production of vaccines and the more immediate problems of research as affecting the Armies in the Field. The Vaccine Department during the five years of war issued over 34,000,000 c.c., of which more than 24,000,000 c.c. were for typhoid and paratyphoid.

Within a few days of the first German poison gas attack laboratories at the College were equipped and a small anti-gas Committee established under the direction of Major W. H. H. Horrocks (later Sir William Horrocks) to control both the design and commercial production of respirators and other defensive equipment. The Committee provided useful information both with regard to pathological lesions caused experimentally by chlorine, and also with regard to the poisonous action of many other gases and chemical compounds that might conceivably be used by the Germans. The constant aim was to forestall any possible new developments of German offensive measures by increasing the efficiency of the respirator, the evolution of which was gradual and continued throughout the war, modification succeeding modification as improvement in the general structure developed.

Experiments were early made at the College in the lethal and repellent action of various preparations against insects, principally lice, and as a result of many such experiments a paste made with crude naphthalene was devised which proved to be an exceedingly efficient and effective insecticide and was eventually issued to the Armies in the Field.

Work on the prevention of food deficiency diseases, particularly beri-beri, was carried out in the Hygiene Department and as a result of a conference with manufacturers and many tests made in the College, a solidified preparation of "Marmite" was produced and issued to the troops.

In other spheres of its activity—and there were many—the College was

greatly assisted by sister institutions in London and elsewhere in aid of the common cause.

The termination of the first World War saw the gradual return to the College of its more normal activities and the reintroduction of the courses for Senior and Junior Regular Officers which were to continue without interruption until the outbreak of World War II.

A significant incident of College history took place on the night January 6-7, 1928, when an exceptionally high tide, coupled with a strong south-westerly gale and unusually heavy flood water, caused some thirty feet of the embankment wall at Millbank to give way with consequent complete flooding of the basements of the College and the loss of much valuable equipment, laboratory animals and museum pieces.

On the outbreak of World War II the Commandant, Major-General W. Brooke Purdon, *D.S.O., O.B.E., M.C., K.H.S.*, remained at the College until June 1940, when he left for France to join the B.E.F., being relieved by Major-General F. S. Irvine, *C.M.G., D.S.O.*, who continued as Commandant throughout the war.

In 1939, as in 1914, Senior and Junior courses for Regular Officers were discontinued, but throughout the war short courses in Tropical Medicine and Hygiene of from eight to ten days' duration were held; up to the end of 1945 some 3,000 officers had attended these.

The Vaccine Department with all its equipment and animals moved to Tidworth in the early days of September 1939.

Some structural damage to the Hygiene Department, Pathology Museum and the Library was caused by an enemy H.E. bomb in September 1940, which necessitated the transfer of the Hygiene Department to Mytchett towards the end of that year—it returned to the College in March 1943.

The activities of the Hygiene Department throughout the war years included, *inter alia*, the investigation and clarification of Mobile Laundry effluents, the composition of a general purpose soap, the design and perfection of the "Millbank" filter bag, the metabolic aspects of the man pack ration and the physiological factors concerned in the design of field clothing and equipment. In addition courses for the training of Specialist Hygiene Officers were instituted in 1940 and continued throughout the war.

Under the ægis of the Medical Research Council (Malaria Committee) a most important piece of chemotherapeutic research on the suppressive action of Mepacrine and its possible toxic effects was carried out at the College from 1943 to 1945 by a special team working in conjunction with the Director of Biological Research at the War Office.

Following the cessation of hostilities in 1945. it was not found possible to resume Senior Officers' Courses until February 1946.

As the experience gained in various theatres of war had so strongly emphasized the importance of personnel selection, raising and maintenance of morale and prevention of psychiatric breakdown, a course of lectures and practical demonstrations in psychiatry was added to the curriculum. The

period of study for individual officers proceeding to Specialist Status (e.g. F.R.C.S., M.R.C.P., D.P.H.) was increased to a maximum of twelve months.

Since 1948 all Lieutenants. R.A.M.C., on first appointment have undergone a course of instruction at the College as part of their initial training, and also newly commissioned Q.A.R.A.N.C. Nursing Officers receive similar initial instruction.

During 1950 the College, in addition to its teaching role, is continuing research work in problems of Army Health, Pathology, Bacteriology, Tropical Medicine and Psychology, while routine pathological and biochemical investigations are also carried out.

Liaison is being maintained with other Departments of the Army, with the Royal Navy, the Royal Air Force and Civil Medical Colleges, Hospitals and learned Societies. For the latter, laboratory and other demonstrations are provided at the College.

COLLEGE PRIZES

THE following prizes are open to students attending the Senior Officers' Course:

THE LEISHMAN PRIZE.—First in Order of Merit. Silver Medal, and name engraved on the Oak Panel in the College Lecture Theatre.

FIRST MONTEFIORE.—Highest in Military Surgery and Radiology. Bronze Medal and cheque approximately £20.

SECOND MONTEFIORE.—Second highest in Military Surgery and Radiology. Cheque approximately £10.

PARKES.—Highest in Army Health. Bronze Medal and cheque approximately £10.

KATHERINE WEBB.—Highest in Medicine, Tropical Medicine and Entomology. Bronze Medal and cheque approximately £12.

Review

SMALLPOX AND VACCINATION. MY CONFESSION OF FAITH. By C. Killick Millard. M.D., D.Sc. With Some Anti-vaccination Comments by Joseph P. Swan. Reprinted from the "Vaccination Inquirer" National Anti-vaccination League, 25 Denison House, 296 Vauxhall Bridge Road, London, S.W.1. Price 6d.

Dr. C. Killick Millard for many years M.O.H. of Leicester has been a frequent contributor to Medical Journals on the problem of the prevention of smallpox. He has now published his "Confession of Faith" (written expressly for non-believers in Vaccination in the hope that it might help to

modify their opinion about this question), together with some "anti-vaccination" comments by Mr. Joseph P. Swan.

Dr. Millard holds the view that vaccination, as carried out in the civilian population in England, may be more of a danger than a protection to the community, since it results in a large number of partially protected individuals who may develop modified smallpox. Being mild, precautions may not be taken and the disease is more likely to spread. "Thus vaccinated persons may be and often are a very serious danger to the unvaccinated," he contends.

He also believes that the remarkable fall in smallpox mortality in England in the nineteenth century was part of a "natural movement" shared by some zymotic diseases and probably due to improved sanitation and social conditions.

Dr. Millard is, however, a firm believer in the protective value to the individual of *recent vaccination*. This is the Army practice—to ensure that the soldier is always "fully protected" an essential requirement in view of the liability to overseas service.

Dr. Millard also criticizes mass vaccination on the occurrence of a few cases of smallpox in a community. This view is in agreement with the policy in the United Kingdom where mass vaccination is not now encouraged and should only be considered when an outbreak appears to be out of control.

C. L. D.

Extracts from the "London Gazette"

HONOURS AND AWARDS

"London Gazette" 24.10.50.

The King has been graciously pleased to approve that the following be Mentioned in recognition of gallant and distinguished services in Malaya during the period 1st January to 30th June 1950:

Colonel C. P. Chambers, late R.A.M.C.
 Colonel P. F. Palmer, *O.B.E.*, late R.A.M.C.
 Lt.-Col. K. H. Clark, *M.B.*, R.A.M.C.
 Lt.-Col. (temp.) T. M. W. D'Arcy, *M.B.*, R.A.M.C.
 Major (Q.M.) B. C. Debenham, *M.B.E.*, R.A.M.C.
 Major R. Paul, *M.B.*, R.A.M.C.
 Major P. A. P. Webberley, *M.B.E.*, R.A.M.C.
 Capt. (temp.) V. J. Logan, R.A.M.C.
 7535558 S/Sgt. G. R. Mannas, R.A.M.C.

PROMOTIONS

(1) *R.A.M.C.*

(a) To be Colonels:

Lt.-Col. W. G. S. Foster, <i>O.B.E.</i>	22.9.50
Lt.-Col L. R. S. Macfarlane, <i>O.B.E.</i> , <i>M.D.</i>	4.10.50

(b) To be Lt.-Cols.:

Major W. Stewart, <i>M.B.E.</i> , <i>M.B.</i>	22.9.50
(with seniority 27.12.49 next above Lt.-Col. E. A. Smyth, <i>M.B.</i>)	
Major R. J. Niven, <i>M.C.</i> , <i>M.B.</i>	4.10.50

(c) To be Majors:	
Capt. H. J. Elverson	26.9.50
(d) To be Major (Q.M.):	
Capt. (Q.M.) W. H. Power	28.9.50
Capt. (Q.M.) R. Luckwell (S.S.C.) <i>M.B.E.</i>	20.10.50
(e) To be Capt. (Q.M.):	
Capt. (Q.M.) W. J. Power (S.S.C.)	18.10.50
(f) To be Capt. (S.S.C. (A. & T.)):	
Lt. P. F. Holley	22.4.50
Lt. J. Heaton	13.6.50

APPOINTMENTS TO SHORT SERVICE COMMISSIONS

(1) *R.A.M.C.*

- (a) Captain Douglas Alexander Knox, M.B., from Nat. Service List to be Capt. (S.S.C.) 28 Sept. 1950, retaining present seniority.
- (b) Lawrence Tippet is appointed to a short service commission 1st Oct. 1950 in the rank of Lt.

RETIREMENTS

(1) *R.A.M.C.*

Capt. J. Hamilton (S.S.C. Type "B") with gratuity	20.9.50
Capt. R. Randell, M.B. (S.S.C. Type "B") with gratuity	29.9.50
Major P. T. Harper, M.D. (S.S.C. Type "B") with gratuity	2.10.50

Obituary

Lieutenant-Colonel HENRY JAMES FLETCHER

IN Rustington on November 4, 1950, Lieutenant-Colonel Henry James Fletcher, M.B., R.A.M.C., Retired, aged 90. Born in Atherton October 7, 1860, he took the M.B. Edinburgh, in 1882, and was appointed Surgeon May 30, 1885. Promoted Surgeon Major March 30, 1897 and Lieutenant-Colonel R.A.M.C. May 30, 1905, he retired May 27, 1919. *

He took part in the Miranzai Expedition in 1891 receiving the Medal and Clasp.

He again saw service in South Africa 1900-02, taking part in the actions at Vet River (May 5 and 6, 1900), Zand River, the actions near Johannesburg, Pretoria, and Diamond Hill (June 11 and 12, 1900), actions at Witterbergen (July 1 to 29, 1900), at Bethlehem (July 6 and 7, 1900), and Eland River (August 4 to 10, 1900), and the operations in Cape Colony. He was awarded the Queen's Medal with four Clasps and the King's Medal with two Clasps.

Note on the Death of Colonel James Swyer

It was some time after the event that I learned of the death of Colonel James Swyer, and I regret that my small tribute to his memory has been delayed for that reason.

I first met Swyer in Hong Kong shortly before the outbreak of war in 1939 and I served with him during many weary months under the darkening shadows of mounting Japanese hostility. These were difficult months, involving family separations, during which his calm exerted a helpful influence upon many who fretted themselves at last into a grudging acceptance of inaction while the deeds of their comrades were lighting beacons in the sky far to the West.

When at last war came in Hong Kong, the brief period of hostilities was soon over, and Swyer continued to serve with the British Military Hospital there under Japanese domination until shortly before the surrender in 1945. It was a long and hard road that had to be travelled and again James Swyer's calm steadfastness was quite characteristic of the man. On very many occasions during these years of captivity I had good cause to be grateful to him for his counsel, always marked by moderation, and he was ever a loyal and helpful colleague.

His health suffered much whilst he was a prisoner. Stretching through the years, a river of rice, the staple diet, sometimes reduced to a trickle but never in spate, indescribably flavoured with strange roots and leaves, was quite insufficient to sustain his large frame, and he suffered grievous privations. His essential kindness remained unchanged and he continued to care for his patients when his health was often little better than that of those in his charge.

Serenely happy in his family life, the rare days when the formalized post-cards, all that were permitted, arrived from his family were to him days of joy.

Calamitas virtutis occasio est. When the challenge came he met it with the fortitude that was his wont, and though he emerged spiritually unscathed, his health had suffered sadly, and after the war he never seemed to regain the vigour that had for years graced the cricket fields and sports grounds of the Corps.

My memory of him is of a loyal and steadfast colleague, and his untimely passing adds one more to the lengthening list of sacrifices exacted slowly and unspectacularly but remorselessly by the late war.

D. C. B.

Major-General WILLIAM BROOKE PURDON

IN London on December 1, 1950, Major-General William Brooke Purdon, D.S.O., O.B.E., M.C., M.B. Son of the late Richard Purdon, of an old Ulster family, great grandson of Surgeon Henry Purdon, A.M.S., and grand nephew of Assistant Surgeon William Purdon, sometime of the 64 Foot, he was born in Belfast, November 28, 1881, and took the M.B., R.U.I., in 1906. Appointed Lieutenant R.A.M.C. January 28, 1907, he was promoted Captain July 28, 1910, Major January 28, 1919, Lieutenant-Colonel June 30, 1931, Brevet Colonel July 1, 1934, Colonel August 1, 1935, Major-General March 1, 1938, and retired November 28, 1941.

He was an Assistant Director of Hygiene, War Office, February 11, 1930 to February 28, 1934, Professor of Hygiene, R.A.M. College August 18, 1935 to February 28, 1938, and Commandant and Director of Studies R.A.M. College March 1, 1938.

He was awarded the *O.B.E.* in 1923, created Officer of the Order of St. John in 1937, and received the Jubilee Medal in 1935. He was made K.H.S. April 15, 1935. He took the D.P.H. Belfast in 1913.

In his younger days he was an Irish Rugby International, being capped three times. After retirement, he was appointed Medical Superintendent of Queen Mary's Hospital, Roehampton, and in 1946 was appointed Ulster Agent in London.

He served in France from September 1914 till the end of the war. Three times mentioned, he was awarded the *D.S.O.* and *M.C.* and the 1914 Star and Clasp, the British War and Victory Medals.

In the late war he proceeded to France as a D.D.M.S. on June 11, 1940, but unfortunately from force of circumstances he came home in ten days' time.

"A good sound Ulster man and fine fellow."

Abstracts of Lectures

EXTRACTS from a series of Autumn lectures given at the Royal Institute of Public Health and Hygiene in November 1950.

THE CONTRIBUTION OF THE BLIND TO THE COMMUNITY

BY

W. G. ASKEW, *O.B.E.*

PEOPLE mistakenly think of the blind as being in a special class, or as being all alike, but in fact they fall into many groups. Some have never seen; some who have seen are now totally blind or can see large objects or distinguish between light and dark; and some have never had more than a minimum degree of sight.

The cause of blindness and the age at which it occurs has its personal effect, but the individual still retains his own temperament, his own interests and aptitudes; and it is important to realize that he is, in fact, very much like everyone else except that he does not see.

The Blind Persons Act of 1920 defines a blind person as one who is so blind as to be unable to perform any work for which eyesight is essential, and this definition has since formed the basis on which blind persons are registered by local authorities. . . .

There are many misconceptions about blind persons. It is not true, for instance, that the memory of a blind person is inherently superior, nor that his sense of hearing, touch, taste and smell are more acute. What is true

is that because of the difficulties, or, in a totally blind person, the impossibility of dividing mental impressions from visual observations, these senses are used as much as possible to fill in the gaps, and it is accordingly right to say that blind persons make a better and different use of these other senses. Contrariwise, there is a misconception that blindness of itself impairs either mental or physical fitness, or both. The true fact is that blindness is a handicap, but this handicap can be, and in innumerable cases has been, overcome. But the blind, like sections of the community, possess wide variations in skill, in knowledge, and in ability, and this inevitably means that there are variations in the use to which the remaining degree of vision is put and any compensatory adjustments are utilized. Education, rehabilitation and training all contribute to the conquest of blindness, and employment—which is the natural sequence of this rehabilitation and training—enables blind persons to live happy and cultured lives, and to make their full contribution to the life of the community.

After giving instances of training for the blind at St. Dunstan's, and elsewhere, and also examples of blind people who have made their way in many vocations, Mr. Askew concluded: "I admire more than I can say the guts demonstrated by so many in accepting the onset of blindness, and the courage shown by them in tackling their re-education, their re-training, and the many problems that beset them; and it is because of these things that I again say that they are entitled to command our respect and admiration for the way they have achieved their Victory over Blindness."

THE ROLE OF CHEMISTRY IN RELATION TO PUBLIC HEALTH

BY

C. J. REGAN, *B.Sc., F.R.I.C.*

THE need for the use of chemistry in other sciences is evidenced by the many categories of chemists now working in the various fields; we have, for instance, physical chemists, biological (or bio-) chemists, agricultural chemists, metallurgical chemists, chemical engineers, and so on: and all these types have some influence on my subject today—the role of chemistry in relation to public health.

Nutrition.—Possibly it is in association with the biologist that the chemist has rendered the greatest service to humanity. Together they have shown that life is a series of chemical reactions. The period of the recent world war saw theories and views about human nutritional requirements put to an acid test . . . Until the beginning of this century it was believed sufficient to ensure that man had, for his bodily sustenance and health, only protein, fat, carbohydrate, water, sodium, calcium, iron and chlorine. Whilst, as a generalization, it is still true that the most prominent of the nutritive requirements is the need for energy (i.e. calories), the importance of other aspects, such as protein problems, vitamin problems, and mineral problems, has been increasingly recognized as they have been more intensively investigated. . . .

Food.—The methods of preservation of foods by canning, cold storage or dehydration, have all involved considerable chemical investigation. For example, in canning, the question of the possible corrosion of the container is of paramount importance . . . Sugar, which is an essential item of our diet, also offers much to scientific research, as witness the rise of the beet sugar industry in this country during the present century: refining procedures are based on chemical methods. . . .

Water.—Whatever the system (of purification) chemistry enters largely into it. . . .

Sewage.—In addition to the actual treatment, chemistry has done much more for this essential Public Health Service as, for example, in the development of safety lamps for the protection of men working in sewers . . . also in the metallurgical field in developing suitable . . . alloys for the machinery necessary for . . . treatment processes. . . .

Medicine.—After outlining various anæsthetics and analgesics developed by chemists, Mr. Regan continued: “. . . It seems desirable to emphasize the remarkable changes effected, since about the end of the first world war, in therapeutic science where chemistry has been able to intervene in such a way as to enable medicine to deal effectively with the causes of disease and not merely with the symptoms.” . . .

Other points dealt with in the lecture were detergents, insecticides, rodenticides, and miscellaneous matters, such as artificial fabrics, fertilizers, the development of building materials, etc. “The list,” stated Mr. Regan, “might be extended almost indefinitely.”

He closed with a description of the work of a chemist in the public health service.

HEALTH SERVICES AVAILABLE TO THE PUBLIC THROUGH THE LOCAL AUTHORITY

BY

A. B. STEWART, M.D., Ch.B., D.P.H.

In considering the health services administrated locally, it would be a mistake to think exclusively of those administered by the local health authorities, that is, the County Councils and the County Borough Councils. Although these local health services are the main subject to be dealt with, it should not be forgotten that all health services are under local control to a considerable extent. . . .

In achieving our present service we have, by typical compromise and with due regard for tradition, placed it under national control, and at the same time kept local interest alive and responsible for the detailed arrangements in all branches of the service.

It is convenient to regard our health services as being made up of three main branches, the general practitioners and allied services; the hospital and specialist services; and the local health authority services. . . .

On the appointed day the local health authorities surrendered control of the municipal hospitals to the Regional Boards, and assumed responsibility for certain duties contained in the National Health Services Act. These may be enumerated briefly here: The Care of Mothers and Young Children; Midwifery Service; Health Visiting; Home Nursing; Provision of Illness-Care and After-care; Domestic Help Scheme; Mental Health Service; Ambulance Service; and in addition, Local Authorities carried on a School Health Service. . . .

My own experience of this work is limited to London, and naturally the remarks made will refer, in the main, to the service as it exists in London. . . .

Among the points made by Dr. Stewart are:

The antenatal, postnatal, and child welfare clinics, transferred to the County Council, have been maintained, and the necessary steps taken for expansion where this is required. . . .

The midwifery service—so far as it concerns confinements in the home—is the concern of the local health authority, and the County Council, either through its own midwives, or by arrangement with other organizations—provides a choice of midwives to all expectant mothers. . . .

The greatly enlarged scope of the work of the health visitor. Not only does the health visitor attend mothers and babies, but she may be called upon to report on matters concerning housing, and other social problems; and a new and closer link with the workers in the hospitals has been established. . . .

CORRECTIONS

The following corrections should be made in letters and articles by Colonel F. M. Richardson in previous numbers of the Journal.

Letter April 1950—p. 214, line 13. *For F.D.S.s read "F.D.L.s. (Forward Defended Localities)."*

TRAINING OF FD. MED. UNITS

1949 (Nov.).

P. 225, 4th line from bottom. *For "slightly" read "slightingly."*

P. 235. Correct "LIAISON" in centre heading.

P. 245, 7th line from bottom *For "adaption" read "adaptation."*

1950 (Jan.).

P. 33, line 26. *For "amphibians" read "D.U.K.W.s."*

P. 36, lines 30 and 31. *From words "A Dance" first line to read "Advance. Can you send us reinforcements."*

Notices

FESTIVAL OF BRITAIN EXHIBITIONS LONDON

Admission, traffic and transport arrangements¹

It has already been announced that His Majesty The King will declare the Festival of Britain open on May 3, 1951, and that The King and Queen will visit the South Bank Exhibition on the morning of May 4, 1951.

The South Bank Exhibition will be open to the public for the first time at 2.30 p.m. on May 4.

The other Festival Exhibitions and the Festival Pleasure Gardens will be opened to the public in the afternoon of May 3.

SOUTH BANK EXHIBITION—May 4 to September 30.

The South Bank Exhibition has been planned as part of a whole programme of Festival events and activities marking the centenary of the Great Exhibition, 1851, in the Crystal Palace, Hyde Park. For this reason it will present a marked difference both in character and in physical extent from the British Empire Exhibition at Wembley in 1924. In particular, the Amusement Park—a feature of all great modern exhibitions—will not be included within the Exhibition but will be located within the Festival Pleasure Gardens at Battersea Park and linked to South Bank by special road and river buses, and by rail via Waterloo Station, and Queen's Road, Battersea. The capacity of the Exhibition *at any one time*, which is estimated at about 60,000, will be small in comparison with Wembley and it is realized that on occasions there may be crowd congestion at some of the entrances. A scheme of guaranteed admission by advance ticket, supplementary to the ordinary turnstile admissions, has therefore been devised. This will help to spread attendances evenly over the whole period of opening and at the same time ensure that members of the public wishing to plan their visit ahead can count on obtaining admission on the day for which they have obtained their tickets.

The price of admission at the turnstiles will be 4s. Advance tickets providing guaranteed admission will cost 5s. on ordinary days and 10s. on Tuesdays. Half-price will be charged in all cases for children under 15. *Except for the Telecinema there will be no supplementary charges for any display or feature within the Exhibition.* Full details are as follows:

¹These extracts from the official notices are published with a view to helping readers who are not in London and particularly those who are abroad, but may have an opportunity and wish to visit this Exhibition.

	<i>By ticket in advance</i>	<i>At turnstiles</i>	<i>Hours of opening</i>
<i>Opening Day</i> <i>May 4</i>	10s.	No admissions	2.30 p.m. to 11.30 p.m.
<i>Tuesdays</i> <i>Only</i>	10s. (Approximately 40,000 available for each Tuesday)	4s. (Admission after 4 p.m.)	10.30 a.m. to 11.30 p.m.
<i>All other</i> <i>days</i>	5s. (Approximately 50,000 available per day)	4s. (Admission after 3 p.m.)	10.30 a.m. to 11.30 p.m.

NOTES.—

(1) Children between the ages of 5 and 15 half-price. Children under 5 will not be admitted.

(2) Advance tickets will be obtainable through the usual agencies. They will be valid for the whole day of issue but will provide guaranteed admission up to 3 p.m. only (4 p.m. Tuesdays). *Admission at the turnstile will commence at 3 p.m. (4 p.m. on Tuesdays)* subject to capacity and will not be guaranteed. There will be no turnstile admission on the opening day of the Exhibition.

OTHER EXHIBITIONS—*May 3–September 30.*

Science—South Kensington.

Architecture—Poplar.

Books—Victoria and Albert Museum.

with special admission prices.

FESTIVAL PLEASURE GARDENS, BATTERSEA PARK—*May 3 to October 31.*

	<i>By ticket in advance</i>	<i>At the Turnstiles</i>	<i>Hours of opening</i>
<i>All days</i>	2s. 6d. (A limited number only available)	2s.	10.30 a.m. to 11.30 p.m.

NOTES.—

(1) Children under 15 half-price.

(2) Tickets purchased in advance will provide guaranteed admission. They will be obtainable through the usual agencies—*see below*.

(3) Special hours will be fixed for May 3, opening day.

SALE OF TICKETS.

Tickets for the South Bank Exhibition and Festival Pleasure Gardens will be available for purchase. Authorized ticket-selling agencies will include British Railways, the principal passenger coach companies, and the principal travel agents and ticket libraries. Tickets will be available for use only on the day named on them and sale at prices other than those marked on the tickets will not be permitted. Subject to availability of tickets, bulk bookings will be accepted, but there will be no reduction in price for purchases in bulk.

TRAFFIC ARRANGEMENTS.

Special methods of approach have been made and comprehensive traffic regulations will be in force including River Services to link the parts of the Festival.

HEALTH CONGRESS AT SOUTHPORT, 1951**THE ROYAL SANITARY INSTITUTE**

90 Buckingham Palace Road, London, S.W.1.

THE preliminary programme of the Health Congress to be held at Southport from April 23 to 27, 1951, which has recently been published by the Royal Sanitary Institute, shows that the following presidents of sections and conferences have been appointed by the Institute:

<i>Sections</i>	<i>Presidents</i>
A, Preventive Medicine	Sir John Charles, M.D., B.S., F.R.C.P., D.P.H., Chief Medical Officer, Ministry of Health.
B, Engineering and Architecture	A. J. S. Pippard, M.B.E., D.Sc., M.I.C.E., F.R.Ae.S., Professor of Civil Engineering, Imperial College of Science and Technology.
C, Maternal and Child Health	Alderman Miss Mary L. Kingsmill Jones, C.B.E., M.A., of Manchester.
D, Veterinary Hygiene	David E. Orr, M.R.C.V.S., Chief Veterinary Inspector, Manchester.
E, Food and Nutrition (in conjunction with the Food Group, Society of Chemical Industry)	A. L. Bacharach, M.A., F.R.I.C., Chairman, Food Group, Society of Chemical Industry.
F, Housing and Town Planning	Lt.-Col. H. P. Cart de Lafontaine, F.R.I.B.A., M.T.P.I., President Town Planning Institute.
G, Tropical Hygiene	T. H. Davey, O.B.E., M.D., B.Ch., D.T.M., Professor of Tropical Hygiene, University of Liverpool.
H, Hygiene in Industry	A. Massey, C.B.E., M.D., K.H.P., Chief Medical Officer, Ministry of National Insurance.
<i>Conferences</i>	John M. Gibson, B.A., M.D., D.P.H., President, Society of Medical Officers of Health; Medical Officer of Health, Huddersfield.
	A. Floyd, C.B.E., B.Sc., M.I.C.E., M.I.Mun.E., President, Institution of Municipal Engineers; County Surveyor, West Sussex C.C.
	Chairman-elect of the General Council, Sanitary Inspectors Association.
	Miss E. Cockayne, Chief Nursing Adviser, Ministry of Health.
1, Medical Officers of Health	
2, Engineers & Surveyors	
3, Sanitary Inspectors	
4, Health Visitors	

The programmes of the sectional meetings and conferences are well advanced and particulars will be issued shortly.

FILM ON OXYGEN THERAPY

A NEW 16 mm. sound film entitled "Oxygen Therapy" suitable for medical, nursing and other professional audiences has just been produced by Kinocrat Films Ltd., London, for Oxygenaire Ltd., manufacturers of oxygen therapy equipment.

The film runs for thirty-five minutes and is in two parts. Part I (465 ft.) covers the history of the clinical use of oxygen, details the physiological aspects of oxygen in the lungs, blood stream and blood plasma and explains the symptoms and classifies the main types of anoxia. Part II (785 ft.) demonstrates the techniques of oxygen administration by face masks, oxygen tents, etc., to infants, children and adults and shows in detail the construction of the latest forms of oxygen therapy equipment. Other essential factors in oxygen therapy, such as various fire precautions to take, are also included in this section.

Many sequences were filmed at the Westminster and Queen Charlotte's Hospitals and the Hospital for Sick Children, Great Ormond Street, with the assistance of the medical staff.

Arrangements for loaning the film for exhibiting to doctors, nurses and students in hospitals and medical schools or at local branch meetings of professional bodies can be made by communicating with Oxygenaire (London) Ltd., 8 Duke Street, Wigmore Street, London, W.1.

JOURNALS

THE following Journals have been received and are available in the Library of the R.A.M. College.

Practitioner, Military Surgeon, Medical Press, Bull. of Hygiene, Medical Journal of Australia, Lancet, Brit. Med. Journal, South African Medical Journal, Indian Jour. of Medical Research, Journal of the R.S.I., Glasgow Medical Journal, Bull. of the Johns Hopkins Hospital, Indian Journal of Malariology, Post Grad. Medical Journal, Journal of the Royal Institute of Public Health and Hygiene, St. Barts Hospital Journal, British Med. Bulletin, Chronicle of World Health Organisation, Revista de Medicina Militar, Proc. of the Royal Soc. of Medicine, Journal of the R.A.S.C., Bull. International des Services de Santa, Tropical Diseases Bulletin, Edinburgh Medical Journal, Journal of R.A.V.C., Clinical Proceedings, Indian Medical Gazette, Journal of the Royal Egyptian Medical Assn., Revue du Corps de Sante Militaire, Archives del Hospital Universities, Quarterly Journal of Medicine, Military Review, Journal of Biology and Medicine, East African Med. Journal, Clinical Journal, U.S.A. Forces Medical Journal, British Journal of Dermatology and Syphilis, Canadian Journal of Public Health, Journal-Royal Naval Medical Services, London Hospital Gazette.

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